Senate Finance and Public Administration Legislation Committee
ANSWERS TO QUESTIONS ON NOTICE
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Question:

Please provide a copy of the report Remoteness, life expectancy and Indigenous health commissioned by the then Department of Families and Housing, Community Service and Indigenous Affairs in 2010-11 from Boyd Hunter at the Centre for Aboriginal Economic Policy Research.

Answer:

Report is at Attachment A. Please note that this is an old report based on data from 2008. Where the analysis breaks the survey data down into homelands compared to other remote areas and non-remote areas, the sample size is very small and the data is highly volatile; as shown in the large confidence intervals on the graphs. Therefore caution is needed in interpreting these findings.

Indigenous Australians in remote areas tend to report their health as 'good' when asked the self-assessed health status question. Recent survey data using blood and urine tests for diabetes and kidney disease have found much higher rates of these diseases in remote areas than non-remote areas for Indigenous Australians. The interpretation of the health status question will depend on whether 'health' is viewed holistically including connection to culture and land or as a biomedical concept linked to absence of disease and incapacity. Therefore, caution is needed in interpreting the findings on self-assessed health data and comparing these across regions.

The relationship between remoteness, life expectancy and health among Aborigines and Torres Strait Islanders

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We are indebted to David Pollack for suggestions on an earlier draft. Special thanks to Pamela Katic and Anna Reimondos for their research assistance in examining the data and literature on income gradients and health outcomes in remote parts of Indigenous Australia.

Aim

This project will explore differences in general health, maternal and child health, housing and social outcomes by broad geographic accessibility. The aim is to determine whether disadvantage exists linearly across broad geographic indicators. There is a desire from FAHCSIA to link this analysis with areas targeted in the Remote Service Delivery National Partnership Agreement. Where possible this will be explored, however data limitations may prohibit this level of detail in the analysis. The project will not determine causal mechanisms associated with better outcomes.

The project will start with a targeted review of the literature on Indigenous disadvantage and health outcomes in rural and remote Australia as well as summarising selected international research on outcomes for rural and remote areas. This review of previous work will be used to identify emerging theoretical perspectives and will set the background for quantitative analysis.

The project uses data from the 2008 National Aboriginal and Torres Strait Islander Social Survey (NATSISS) and the Longitudinal Study of Indigenous Children (LSIC) as well as some Census data to model the differences in outcomes across remote areas in four domains:

1. general health,
2. maternal and child health,
3. Social/ community/ cultural identification.

The geographic classification used combines indexes of remoteness (accessibility of the area) with information on Indigenous interactions with homelands (depending partially on which data source is used). The models will use socio-demographic controls to ensure that the best possible comparisons can be made. For example, indicators of age, family structure, income and employment will be used as controls. In an effort to illuminate some issues in current debates much of the analysis is conducted by equivalent income (ranked according to the Australian population averages). The analysis also uses multivariate regression models based on cross sectional data but questions about the quality and comparability of data leads to the use of a parsimonious specification. Note that possible data quality issues and the analytical complexity of the models implicitly discussed in the debate mean that causal relationships can not be empirically tested using available data. Notwithstanding, the research can provide some insight into what is currently happening and what policies may assist delivering better outcomes for remote Indigenous people.

Homelands and outstations

While this report focuses on remote areas as a whole, many anthropologically informed studies indicate that may be important to distinguish outstations or homelands in any geographical analysis. The Housing and Infrastructure in Aboriginal and Torres Strait Islander

Communities document [sometimes known as CHINS] defines an outstation as:

> A discrete community that has a population of less than 50 and is linked to a larger parent discrete community or a resource agency for the provision and maintenance of services, such as housing, water, power supplies and sewerage. For the purpose of this survey outstations may also include homelands. (ABS 2007: 114)

The definition of homelands is relatively straightforward—the Macquarie Atlas of Indigenous Australia states a homeland is, "an Indigenous person's ancestral country" (Arthur and Morphy 2005: 262). ABS (2007: 111) quite rightly point out that people may not live in their ancestral lands permanently; hence it is a geographic sense of belonging that relates to an individual rather than an area and the following analysis will address this distinction in passing.

The Australian Human Rights Commission [AHRC] prefers the term homelands over outstations because 'it is a more accurate description of these communities and it is the preferred term of the Aboriginal residents of Homeland communities' (2008: 6).

The reason why we are interested in outstations and homelands is that it is likely to be associated with the cultural and spiritual needs of an individual. The difference between homeland and non-homeland areas is important because it may be associated with the effects of the loss of culture and customary activities and beliefs. Dockery (2009) rehearses some theory and evidence on the effects of such loss on overall wellbeing, but this report is more focused on the effects on health and ultimately life expectancies.

Stanner's (1968: 44) reflections help westerners understand some of the background history to the term homeland.

> No English words are good enough to give a sense of the links between an Aboriginal group and its homeland. Our word 'home', warm and suggestive though it may be does not match the Aboriginal word that may mean 'camp', 'hearth' 'country', 'everlasting home', 'totem place', 'life source', 'spirit centre' and much else all in one.

Notwithstanding the inadequacy of the word 'homeland', it will be used to denote a person's ancestral country for the following analysis.

Policy context

The Council of Australian Governments adopted six 'Closing the Gap' targets in 2008:

1. Close the life expectancy gap within a generation;
2. Halve the gap in mortality rates for Indigenous children under five within a decade;
3. Ensure access to early childhood education for all Indigenous four years olds in remote communities within five years;
4. Halve the gap in reading, writing and numeracy achievements for children within a decade;
5. Halve the gap for Indigenous students in year 12 attainment or equivalent attainment rates by 2020; and

6. Halve the gap in employment outcomes between Indigenous and non-Indigenous Australians within a decade (Commonwealth of Australia 2009).

While only one of these targets directly refers to remote areas, all the other targets are expected to represent a binding commitment irrespective of the remoteness or accessibility of the local area.

The National Indigenous Reform Agreement has been established to implement a new remote service delivery model that clearly identifies service standards, roles and responsibilities and service delivery parameters to ensure that Indigenous Australians living in selected remote communities receive and actively participate in services to close the gap in Indigenous disadvantage (i.e. COAG's 2008 NATIONAL PARTNERSHIP AGREEMENT ON REMOTE SERVICE DELIVERY). Through this Agreement, the Commonwealth, the States and the Northern Territory will work together with Indigenous communities to improve Indigenous Australians access to government services, including early childhood, health, housing and welfare services through a single government interface. A total allocation of $291.2 million has been made over six years to improve the delivery of services across 29 remote locations. The agreement has many laudable goals, including culturally appropriate service, but it is beyond the scope of this report to comment on or assess this model which is left for other research.[1] Notwithstanding, these agreements form an important policy context that will be referred to again in the concluding section.

Literature review on Indigenous health and life expectancies

Selected evidence on Indigenous health in remote communities

There is a wide and ongoing gap in life expectancy between Indigenous and other Australians (although there is some controversy over the extent of this gap (Altman, 2009)). Furthermore, there is considerable evidence that this gap is much larger in Australia than that in other similar countries that are commonly used in international comparisons (Griew, 2008; Ross, 2002).

Griew (2008) provides a useful introductory summary of evidence on Indigenous health and primary health care issues. On an international level, stronger primary health care systems are associated with better health outcomes (especially low birth weight and infant mortality—see Griew 2008: 32). Griew argues that Indigenous Australians have yet to reap the full benefits of health care services that their Indigenous counterparts overseas have achieved. Furthermore he argues, notwithstanding the powerful and demonstrable effects of the social determinants of health (e.g.,

1. For example, Sanders (2010) argues that the 20 proposed Territory Growth Towns are geographically skewed to the top end rather than the arid zone of the Central Desert and the rest of the Northern Territory. He argue that the existing settlement hierarchy actually has up to 80 small 'open towns' that act as central place service hubs for a more widely dispersed remote population, sometimes living in homelands or outstations.

see Bronfenbrenner, 1979), primary health care has an important independent contribution to make for 'closing the gap' in life expectancy between Indigenous and non-Indigenous Australians.

Just as there is a 'life expectancy gap', an 'infant mortality gap' between Indigenous and non-Indigenous peoples exists in First World countries (Griew, 2008: 52}. Wilson et al (2007) claim that increases in life expectancy in the Northern Territory are significantly due to large declines in infant and early childhood mortality. This has been linked to improved access to primary care services in remote areas, both through government and community-controlled services, from the 1970s onwards.

Much of the evidence on Indigenous health in remote communities does not distinguish between types of communities; nonetheless the evidence needs to be understood to set the scene for this report. Graham et al. (2007) shows that the proportion of healthy babies in remote, regional and city areas was 74.9, 77.7, and 77.6 per cent respectively. After adjusting for maternal age, smoking, diabetes, or hypertension, babies are less likely to be healthy in remote areas (i.e., the odds ratio of 0.87 which is significant at the 95 per cent level). In terms of peri-natal outcomes remote areas are significantly more likely to have low birthweight and low 'Apgar' score (5 minutes after birth), but there was no significant differences in terms of stillbirth and pre-term birth. Given the potential access issues to hospitals it is not surprising that outcomes are worse in remote areas. However, as the proportion of healthy babies shows the differences between remote and other areas is relatively small (Graham, Jackson Pulver et al. 2007).

Clucas et al. (2008) indicate that scabies is endemic in the Northern Territory (with up to 50 per cent of children and 25 per cent of adults being infested at some times). Clucas et al. (2008) look at the frequency of presentations and infectious disease burden for primary health care (PHC) services in two remote Aboriginal communities in tropical northern Australia. Children average about two visits per month to PHC services in their first year of life. Access to PHC is a critical component of a healthy start to life. Note that the study did not analyse the estimated 20 per cent of children who did not present to the PHC. Obviously absence from the clinic does not mean absence of disease and hence the actual incidence of disease may even be higher. Given the high rates of clinic presentation means that illnesses in childhood become the social norm, which in turn may lead to other instances of ill-health not being reported (because respondents may not consider it out of the ordinary).

Jamieson et al. (2006) examine 3 communities in the Top End as part of a wider study of the implementation and monitoring of fluoridation plants in two of those communities. Until the 1980s, Indigenous children were recognised as having better oral health than their non-Indigenous counterparts (Barrett 1972; Jamieson, Bailie et al. 2006). Now on average Indigenous children have twice as much tooth decay as, and in some communities up to five times as, their non-Indigenous counterparts.

Children in the Jamieson et al. (2006) study illustrated poor food choices which was potentially linked to nutritional deficiencies. Some common reasons for this are often attributed to the

- lack of healthy food available in communities
- lack of culturally appropriate information on healthy food; and the
- lack of nutritional knowledge of carers.

Bailie et al. (2010) show that remote Aboriginal communities experience exceptionally high rates of common childhood infections including otitis media, skin and respiratory infections and gastroenteritis. These infections have serious consequences including chronic otitis media, bronchiectasis, rheumatic heart disease, impaired growth and development, permanent hearing loss and consequent poor educational outcomes. Ultimately, these contribute to chronic disease in adults and the poor life expectancy of Indigenous Australians. Bailie et al. (2010) explores the relationship between housing conditions and the functional state of infrastructure with common childhood illnesses using a multilevel regression framework. Among the possible interactions between infrastucutre and illness they highlight crowded houses and cigarette smoking (Bailie et al 2010: Figure 1). Overcrowding leads to increased interpersonal contact between residents which promote the spread of infection, especially respiratory disease and scabies. Poor housing conditions combine to create other day-to-day stressors (e.g. lack of privacy loss of control, high demand noise, lack of sleep) which lead to poor mental health that has obvious impacts for the quality of life. Bailie et al. (2010) focus on 5 illnesses: respiratory infection (28.8%), diarrhoea (30.6%), ear infection (28.0%), scabies (17.1%) and other skin infections (19.7%). The vast majority of children had one of these conditions of interest in the two weeks preceding the survey and many children had more than one condition (NB the above percentage add to more than 100 as children may have had more than one illness).

Smoking prevalence was higher in remote than in non-remote areas, (49% and 43% respectively, with some increase in remote areas evident, despite declines in other areas (ABS 2009). Brady (2002) identified that in some communities, 'bush' tobacco is used as a part of traditional lifestyle and local culture, especially in remote Indigenous communities. Sharing tobacco plays a large part in the social life of many Aboriginal and Torres Strait Islander people, and using tobacco reinforces family relationships and friendships. Johnston (2008) has suggested that programs which address the family and community context of smoking may be more likely to succeed.

The other side of the coin is that dispossession and institutionalisation, and the separation and loss that resulted, led to more risk-taking behaviour among Indigenous people, including tobacco use. Thomas et al (2008a) found that Aboriginal or Torres Strait Islander people who had been removed from their families were twice as likely to be smokers.

Many remote Indigenous communities have themselves prohibited the consumption of alcohol within their boundaries. Although questions have been raised about how effective such policies are in establishing truly 'dry'

communities, overall the evidence suggests that such prohibitions result in reductions in alcohol-related harm (NDRI 2007). As part of the Northern Territory Emergency Response, also known as the 'Intervention', prohibitions were imposed on additional remote communities. However, there are no studies of the effectiveness or otherwise of these externally imposed prohibitions compared to voluntary impositions.

Altman (2010: 265) correctly describes remote Indigenous communities as 'invariably postcolonial constructs resulting from fraught historical processes of invasion, land alienation warfare and colonial incarceration'. Altman goes on to outline that the National Indigenous Reform Agenda (sometimes referred to under the rubric 'Closing the Gap') is a risky strategy because it picks a handful of winners in remote Australia (Altman 2010: 269). Altman offers a positive challenge to the State project of 'normalisation' through his alternative model of the hybrid economy where customary activities are sub-vented through an active engagement with either the public or private sectors (or both). Altman's most relevant observation (for this report) was that a number of prescribed communities, 'hubs' in the hubs and spokes model of service delivery, have a 'higher degree of despondency' linked to the disempowerment embodied in the Northern Territory 'Intervention' (Altman 2010: 269). If true, this has important implications for the ongoing viability of the reforms and the ultimate success in improving Indigenous health in remote communities. However, most of the evidence in this report does not reflect adversely or positively on the Intervention as either the data used was collected before the intervention or it was not clear that there was sufficient time for the outcomes to be attributable for the policy.

There is a confluence of government welfare with Indigenous norms of reciprocity in food choice (& ultimately poor nutrition), through adaption of customary behaviour sometimes referred to as 'demand sharing' (i.e. reinforcing of Indigenous social relationship through sharing of resources such as food, see Peterson 1999). If health outcomes are to improve, the cultural clash between demand sharing and western individualised strategies for personal development need to be addressed. At the least, cash management and nutritional education will have limited effect on healthy lifestyles unless the construction of policy takes into account the consequences for Indigenous norms and values.

Clearly, the post-colonial experience differs between remote Indigenous communities with some communities being located reasonably close to towns with substantial mainstream or non-Indigenous economy. Perhaps a more important factor is the ability to live 'on country' in homelands or outstations as this potentially allows spiritual health to be addressed along with physical health. However, the possible trade-offs for living in homelands for Indigenous health is that infrastructure is less developed in such areas and hence it is an empirical question as to the relative health of living on country in remote areas.

Homelands, outstations and Indigenous health

One seminal study by Morice (1976) presents the outstation movement as a viable, Aboriginal-initiated solution to some of the dilemmas facing present-day Australian Aborigines. The most relevant claim, from the point of view of this report is that there were significant psychosocial benefits from the establishment of outstation in Utopia.

Preuss and Brown (2006) attempt to identify the reasons for the success of the Mt Theo Program in stopping petrol sniffing. They attribute the success to an outstation and youth program that simultaneously addresses many aspects of the underlying causes. They also emphasise that it is a community-initiative that moves beyond crisis intervention and involves a strong partnership between Indigenous and non-Indigenous team members.

Recent research (see for example: Andreasyan and Hoy, 2009; Burgess et al., 2009; McDermott et al., 1998; Scrimgeour, 2007) provide increasing evidence for a positive relationship between caring for country type programs and health. Berry et al (2010) identify potential co-benefits of living on, and caring for, country for climate change adaption and the mental health benefits. They provide a theoretical model whereby caring for country can effect social and emotional well-being either directly or indirectly via its effect on social capital (2010: 143, especially Fig. 1). Whatever the merits of this argument, readers are referred to Hunter's (2004) critical analysis of the use of social capital theory in the context of Indigenous Australia.

Living on country suggests a greater link to customary life. Altman et al. (2011) explore the relationship between participation in the customary sector and self reported measures of health and well-being using NATSISS. They acknowledge the existence of causality issues when interpreting the correlations but report several salient findings: Those who had fair or poor health were significantly less likely to participate in at least one of the selected customary activities than those who had good health. Hunting is associated with increased happiness, but, if one is not calm or peaceful one is less likely to fish or hunt. Additionally, those who recognise an area as a homeland were significantly more likely to participate in cultural production than those who did not.

Kowal (2010: 180) claims that the terms 'outstation' or 'homeland' gained some currency in the 1970s under the post-assimilation government policies even though there may have been earlier references. From the 1980s, the CDEP program extended to outstations and this program support became the backbone of economic activity. Overall, the characterisation of outstations has been rather idyllic since the 1970s. For example, research on residents in Utopia found that both mortality and chronic disease risk factors were between 40 and 50 per cent lower than the NT Indigenous average (see Rowley *et al.* 2008).

Kowal (2010: 183) claims that studies presented by outstation 'advocates' are argued to be proof that the outstations are better for health, but the evidence is more problematic and interesting than the progressive outstation narrative reveals. This report seeks to develop the narrative by documenting some of these complexities by providing a richer description of the characteristics of homeland versus other remote Indigenous residents.

Kowal (2010: 184-5) argues there is a chasm between the scientific evidence and supporters of the positive outstations characterisation embodied by the fact that 'all evidence points to a social gradient where heath gets worse the more remote a person is'. Kowal acknowledges that larger 'centralised remote communities (hubs) and outstations may have different outcomes, but she expresses some scepticism on the grounds that outstations have less infrastructure and fewer services than larger communities.

Income gradients of health status: an introduction

The National Aboriginal and Torres Strait Islander Health Survey 2004-5 showed a range of socioeconomic factors linked to health status (ABS 2006). Those with higher incomes were less likely to smoke (40% vs 55%). Those who had completed Years 12 were less likely to smoke than those who had not (34% vs 55%). Those who were employed were less likely to smoke (45% vs 66%). Even when all other demographic details are taken into account, Aboriginal and Torres Strait Islander people were around twice as likely to be daily smokers. Smoking is just one (albeit very important) risk factor for health, but there are clearly some socioeconomic gradients in smoking and hence we have a sufficient reason to look for evidence on the extent of social gradients in health status and associated risks and correlates.

Most of the figures in this report that use the 2008 NATSISS data report the results by income quintiles in homelands and other remote areas and juxtapose these graphs with the analogous results for non-remote areas. Why should the reader be interested in income and social gradients? The most important reason is that the access to income means that one can purchase health and other services if they are available. In many emergencies, it may be possible to go to areas where such services are provided, especially if one can afford to get there, but it is not always possible to do so quickly enough and hence the local health infrastructure is an important consideration.

There is a long and established history of international studies examining income gradients in health. Krieger (2001) categorises the theories that explain social gradients of health in 3 categories:

- *Psychosocial theories*, that focus largely on the social environment which influence susceptibility to disease and illness (with stress as the link between lower social status and behaviours and choices that pose a risk to health);
- *Social production of disease theories* (also more intuitively called the political economy of health) that place greater emphasis on distal factors economic and

political determinants that have an indirect effect on health outcomes through the generalised stress they induce; and

- *Eco-social theories* that attempt to integrate these two theories into a more dynamic multilevel framework.

The following places some emphasis on income gradients in order to highlight the potential role of access to resources of individual households in remote areas. However, other economic, social and other factors associated with stress. Ultimately, the infrastructure or rather lack of it in some remote areas is likely to be a crucial factor in determining long-term health outcomes. Such structural factors are embedded in the current policy paradigms in the language of 'hubs and spokes' can probably be classified under the political economy of health. Notwithstanding, the following provides a selected range of social and economic outcomes in the homeland 'spokes' and other remote areas that may or may not be 'hubs' in order to get a sense of the relative role of psycho-social, and cultural factors and income with a view to identifying the role of stress and other drivers of health.

Gray, Hunter and Taylor (2004) found that, whatever the family income, Indigenous people use health services much less than other Australians (despite experiencing higher mortality and morbidity). Overall, there was no significant association between income and Indigenous health status and utilisation of health services, which they claim may simply reflect poor data quality. However, Gray, Hunter and Taylor discuss two other possible explanations for the results: the Barker Hypothesis and social exclusion hypotheses. The latter could be considered a social production of disease model, but as they introduce the theory it can also relate to the long-lived stress of social exclusion that manifest itself as ongoing health issues later in life. The Barker hypothesis, also known as a 'fetal-infant origins' hypothesis which identifies long lived health disadvantage, can probably best be classified under the psycho-social theory despite the causal pathway being rather distal in nature (see Barker 1994). That is, the fetal-infant experience is directly related to health in later life rather than relating indirectly to political economic context (either now or then). It is entirely possible that other psycho-social pathways may be relevant in explaining the lack or otherwise of an income gradient.

Other studies have replicated the lack of an income gradient in Indigenous health (Hunter 1999; Zubrick *et al.* 2005). Social gradients have also been difficult to identify using non-income measures of social status such as labour force status (Hunter 2000). This last study is relevant in the current context in that there was no social gradient evident in either urban or non-urban areas.

Following standard practice in the poverty and inequality literature, income gradient studies almost always use an equivalence scale to adjust raw income to account for the cost of maintaining households, which will vary with household size and composition.

Indigenous families experience substantial and multiple forms of economic burden, which largely arise from the size and structure of their families and

households (Daly and Smith 1996). Indigenous people are more likely to live in larger multi-generational households than other Australians, especially in remote areas. The complexity of extended family formations has important implications for the use of equivalence scales in the Indigenous context. Hunter, Kennedy and Biddle (2004) illustrate this importance by demonstrating that poverty can vary substantially with different assumptions about equivalence scales, especially for larger Indigenous households. Notwithstanding, the findings in Gray, Hunter and Taylor (2004) were robust over a wide (or feasible) range of equivalence scales.

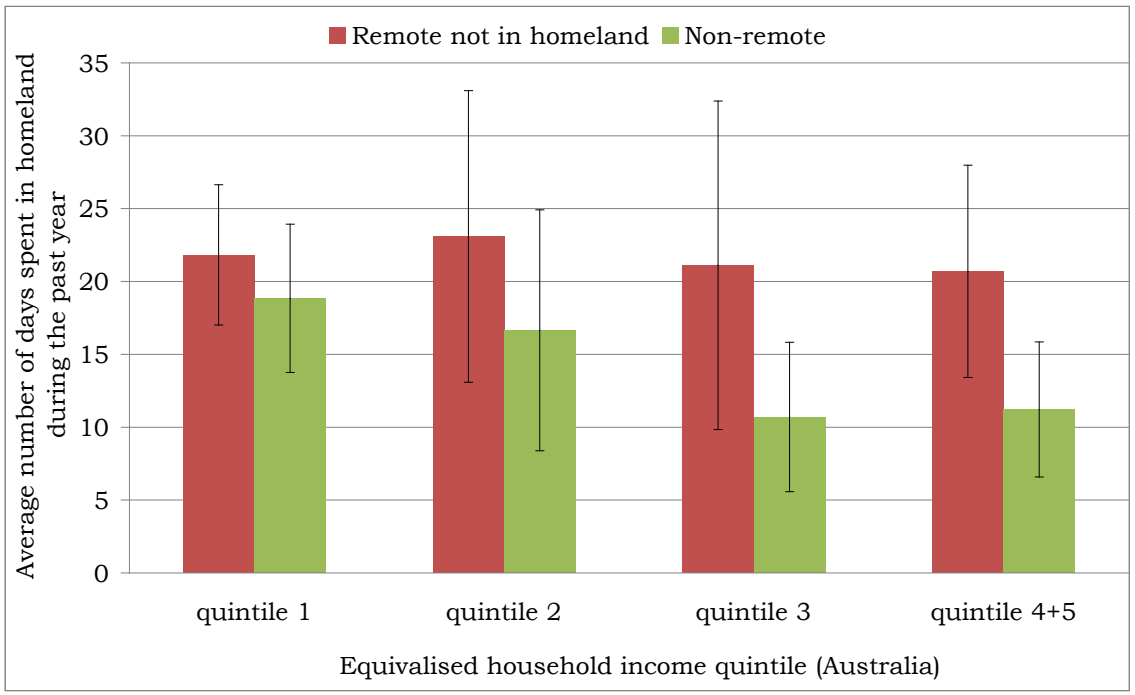
While there is some evidence that social gradients of health are less relevant for Indigenous Australians, other multivariate research indicates that there is a gradient for health risk factors (e.g., income gradients for smoking Thomas *et al.* 2008b). Other multivariate studies find social gradients with health when measured against the socioeconomic status of an area (Cunningham *et al.* 2008; Oddy *et al.* 2008). None of the studies that provide evidence for social gradients for Indigenous health focus on remote areas and hence this is an unresolved issue that this report seeks to shed some light on.

Homelands and other remote areas

The literature above indicates that there are some assertions in the literature that health and life expectancy may be better in some remote areas where people have access to their homelands (sometimes called outstations) for which they have spiritual connection. This section will provide some evidence on this relationship. However, it is important to tease out some of the relationships of Indigenous people with their homelands before attempting to understand the relationship with health status and income gradients. The first issue is the extent to which people recognise their homelands. The vast majority of Indigenous Australians recognise their homelands: around two-thirds of non-remote residents and 86.1 per cent of remote residents.

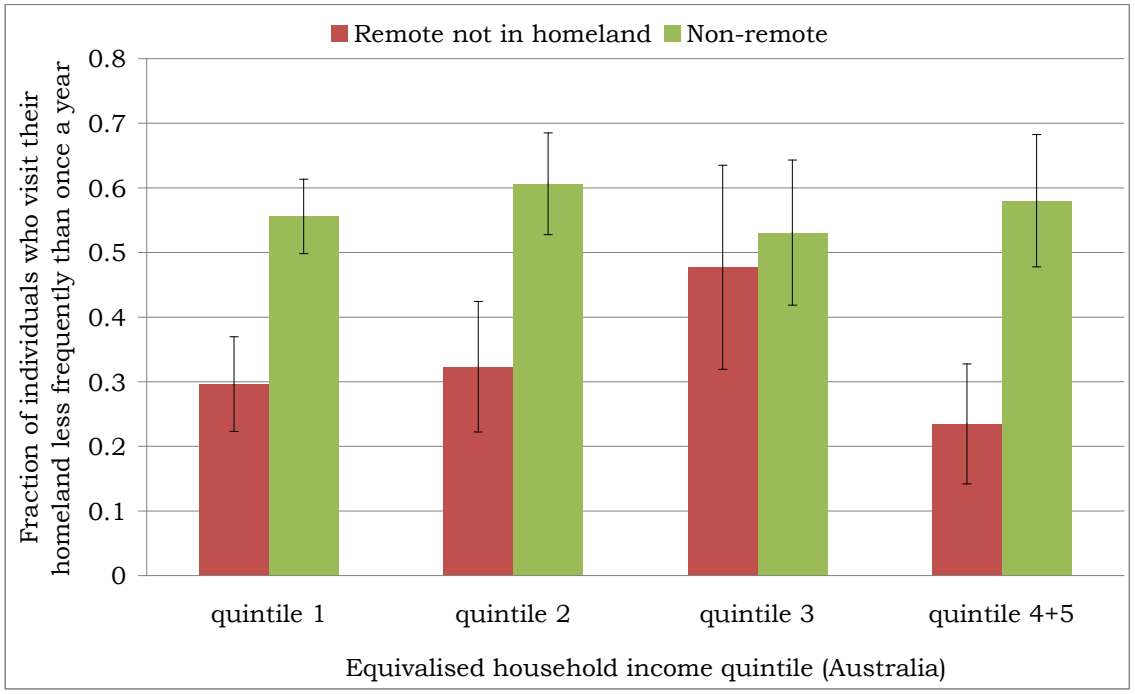
Obviously people who live on their homelands have the potential ability to relate spiritually with their country, but other Indigenous people have varying degrees of access to their country. Figure 1 illustrates the number of days spent on homelands in the last year (for those aged 15 and over who recognise their homelands) by income quintile for those respondents not living on their homelands. People in remote areas spend just over 20 days per year on their homelands compared to less than 20 days per year for non-remote respondents to the 2008 NATSISS. However, the difference between exposure to one's homeland is only significantly different in remote (non-homeland) and non-remote areas for the respondents in the top 60 per cent of Australian incomes (i.e. measured as equivalent income to take account in differences in the size and composition of households).

Figure 1. Days spent on homelands in last year



Notes: Population is selected persons 15+ who recognise an area as their homelands and are allowed to visit. The means for each quintile group are estimated in Stata using the 'svrmean' commands. The 95 per cent confidence intervals, which are reported as 'whiskers' around the mean, are calculated with a bootstrap estimator of standard errors using the jackknife technique.

Figure 2. Visit homeland less frequently than once a year



Notes: See Figure 1. .

Given that Figure 1 documents exposure to homeland in the last year, Figure 2 focuses on whether a respondent visits their homeland less

frequently than once a year (conditioned on them recognising where it is). However, it is easier to couch the following discussion in terms of the obverse—that is, whether the respondent visited their homeland at least once a year. The above figure indicates that people living in remote areas are more likely to have visited their homeland in the last year than non-remote population. Indeed, of those who recognise their homelands less than half of the non-remote respondents visited the homeland in the last year, compared to around 70 per cent of remote respondents not living on homelands. Perhaps one reason for this is that they are choosing, consciously or otherwise to live in remote areas that are relatively close to their homelands. Certainly, many of the residents in town camps are living in clan groups with links to the 'local' area. Note that this difference is significant for most income quintiles except the third income quintile.

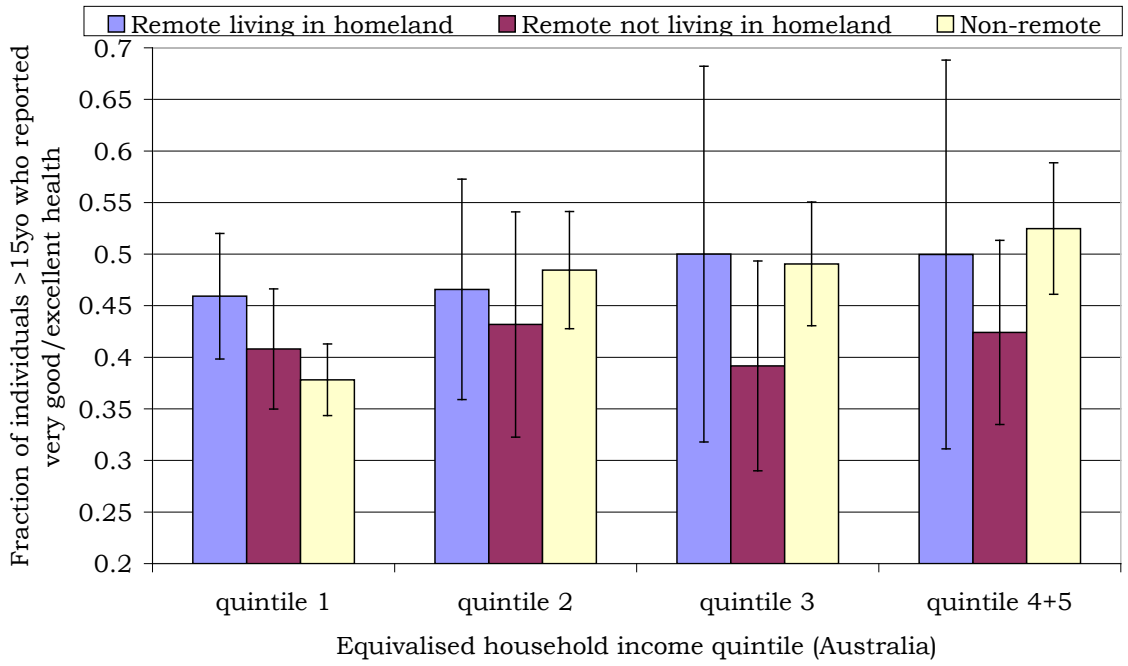
Figure 3 reports the income gradients for fair or poor health status among Indigenous people aged over 15 year olds. The first thing to note is that there is an observable income gradient for the non-remote Indigenous population in the NATSISS, but there is no significant gradient for either homelands or other remote areas. Notwithstanding, it is worth noting that among low income households (in the bottom quintile), the homeland respondents are less likely to report fair or poor health than other remote respondents, who are in turn less likely to report this health status than non-remote respondents. Note that irrespective of the income of the household, the average homeland respondents are less likely to report fair or poor health than other remote respondents (& most non-remote respondents conditioned on household income), but the differences are not significant. These observations are consistent with the hypothesis that living on country is associated with slightly better health outcomes. The fact that these differences are only significant in the low income households may be explained by the fact that income does facilitate the access to services that cost money, especially the cost of getting to where services are provided. Living on country may have positive effects on health and well-being irrespective of income, and the less access to homelands the more likely the person is to report fair or poor health—that is, low income non-remote residents have the worst health outcomes. Furthermore, low income appears to be a binding constraint on accessing health services for people not living on homelands. While the income gradient is manifest in non-urban areas, even in remote non-homeland areas there is a significant difference between the top and bottom income groups in terms of the proportion reporting fair or poor health.

Figure 3. Income gradients for self-assessed health status is fair or poor, Indigenous people aged 15 and over

Notes: The means for each quintile group are estimated in Stata using the 'svrmean' commands. The 95 per cent confidence intervals, which are reported as 'whiskers' around the mean, are calculated with a bootstrap estimator of standard errors using the jackknife technique. The shading in the figure is different to that in the Figures 1 and 2 to highlight that there is a slightly different geographic focus/aggregation.

Figure 4 explores whether there are symmetrical results for those reporting very good or excellent health in the respective areas. The income gradient is less evident in non-remote areas, but the bottom quintile group are less likely to report good or excellent health all higher income groups. There are no evident income gradients for this measure of health status among remote respondents. If one confines one's attention to the bottom quintile of income, homeland respondents are more likely to report better health than other remote respondents, who are in turn more likely than non-remote areas—however, the only significant difference is that homelands report being in unambiguously better health than non-urban areas.

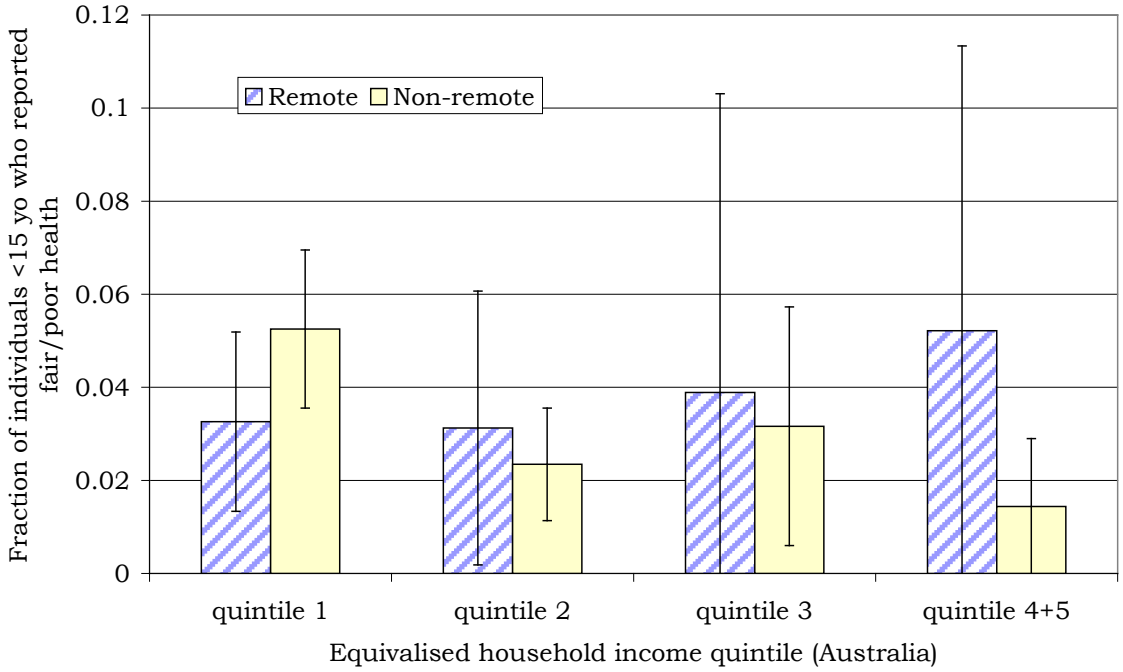
Figure 4. Income gradients for self-assessed health status is very good or excellent, Indigenous people aged 15 and over



Note: There is no necessary reason why Figure 4 should be the obverse of Figure 3 as self-reported health status can also be 'good' (as opposed to fair, poor, very good or excellent. The shading in the figure is again different to that in the Figures 1 and 2 to highlight that there is a slightly different geographic focus/aggregation.

It is not possible to distinguish the information for under 15 year olds living on homelands as this information on the recognition of homeland and related questions are not collected for that population. Accordingly, income gradients for self-assessed health status are only reported in Figure 5 for overall remote and non-remote areas. This figure illustrates that relatively few youths under 15 years old nominate that their health fair or poor. Notwithstanding, there is some evidence of an income gradient in non-remote areas with respondents in bottom quintile households being more likely to indicate their health is fair or poor. As with the older respondents in remote areas, under 15 year olds do not appear to have an income gradient (at least with respect to fair or poor health).

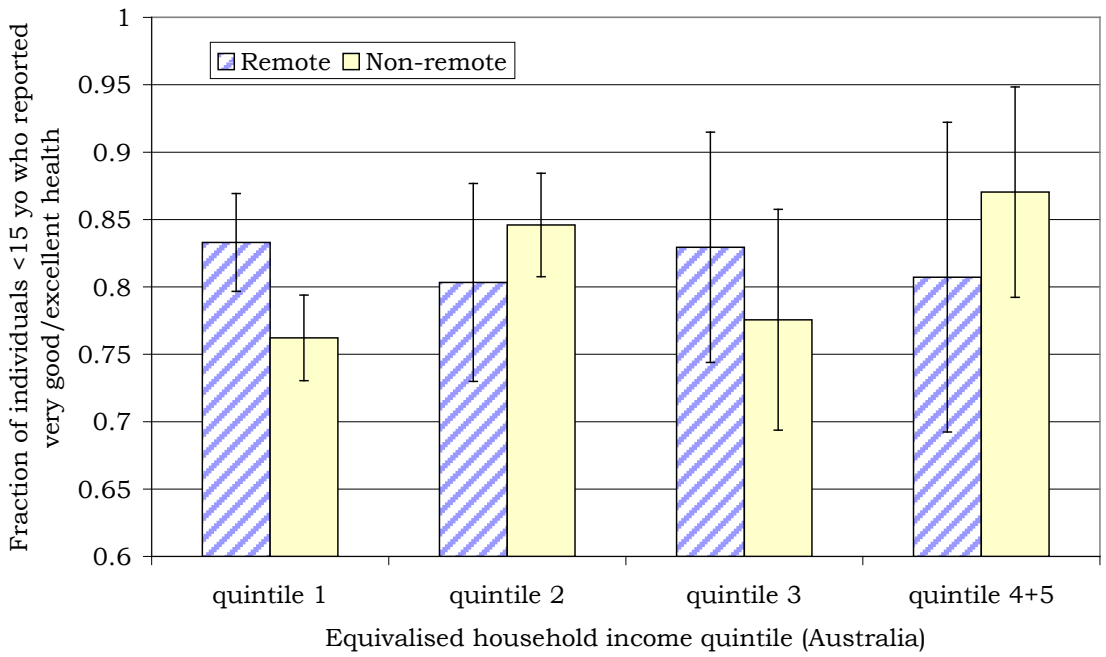
Figure 5. Income gradients for self-assessed health status is fair or poor, Indigenous people aged under 15 years



Note: The shading in the figure is different to that in the Figures 1 to 4 to highlight that there is a slightly different geographic focus/aggregation (ie remote homeland and remote non-homelands are aggregated into one remote category).

Figure 6 confirms that there was no significant income gradient for self-assessed health status in remote areas when one focuses on the very good or excellent status. However, younger respondents in low income (bottom quintile) households in non-remote areas are significantly less likely to report very good or excellent health than either the second, fourth and fifth quintiles.

Figure 6. Income gradients for self-assessed health status is very good or excellent, Indigenous people aged under 15 years



Note: See Figures 4 and 5.

In summary, Figures 5 and 6 confirm the results in the previous two Figures—that is, in contrast to the results for non-urban areas, there is no income gradient evident for under 15 year olds. If we confine our attention to the bottom quintile income, remote youth are about more likely to report better health outcomes than other younger Indigenous people. So what might explain these differences. Given that there is no adequate (let alone comprehensive) description of homeland population, the next section describes some factors that may potentially be correlated with Indigenous health to assist the reader in weighing up some explanations of the observed results in the above slides. To facilitate this analysis, the figures are presented in a manner symmetrical to those presented above (wherever possible). However, before presenting more figures we will conduct a rudimentary regression analysis to introduce some relevant issues.

The relationship of self-assessed health status with potentially explanatory factors

What explains the patterns of self assessed health status observed above? There are many potential candidates, but this section initially adopts a parsimonious approach that controls for education and selected demographic factors in a rudimentary fashion before taking a more expansive approach which describes a richer context for remote respondents who may or may not live in a homeland.

Table 1, Regressions for Self-assessed health (SAH) status for Indigenous people aged over 15 years old

	REMOTE & living in homeland		**REMOTE & not living in homeland**		**Non-REMOTE**	
1. Fair/Poor SAH						
Variable	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Age	0.061	(0.015)	0.064	(0.012)	0.055	(0.006)
Age^2	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Female	-0.006	(0.092)	0.137	(0.078)	0.043	(0.040)
Bachelor	-0.373	(0.339)	-0.370	(0.223)	-0.628	(0.088)
Other post-school qualification	-0.232	(0.162)	-0.038	(0.117)	-0.496	(0.055)
Year 12	0.017	(0.170)	-0.036	(0.154)	-0.576	(0.078)
Year 10_11	-0.068	(0.117)	-0.112	(0.101)	-0.398	(0.054)
Education undetermined	0.302	(0.255)	0.076	(0.235)	-0.411	(0.112)
Pseudo R-squared	0.1043		0.1084		0.0938	
N	1,151		1,484		5,188	
2.Very good/ Excellent SAH						
Variable	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Age	-0.057	(0.012)	-0.061	(0.011)	-0.046	(0.006)
Age^2	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Female	-0.135	(0.077)	-0.277	(0.069)	-0.166	(0.036)
Bachelor	0.657	(0.283)	0.163	(0.198)	0.626	(0.081)
Other post-school qualification	0.067	(0.133)	0.128	(0.108)	0.402	(0.054)
Year 12	0.009	(0.137)	0.009	(0.128)	0.515	(0.068)
Year 10_11	0.098	(0.095)	0.028	(0.088)	0.294	(0.051)
Education undetermined	-0.478	(0.238)	0.189	(0.213)	0.197	(0.103)
Pseudo R-squared	0.0671		0.0735		0.0608	
N	1,151		1,484		5,188	

Note: Robust standard errors of the coefficients are presented in brackets. The t-statistics can be calculated by dividing the coefficient by the standard error and if the value is greater than 1.96 than the statistic is significantly different from zero at the 5 per cent level.

Table 1 provides regressions of the respective areas for self-assessed health being 'fair/poor' and 'very good/excellent'. In terms of goodness-of-fit of the regressions, the first thing that should be noted is that the pseudo R^2 is not high and this specification does not explain much of the variation in Indigenous health status. The age results are consistent with expectations in that poor health increases with age. For very good or excellent health, the increase takes place at a lower rate as one gets older (N.B., the coefficient on Age^2). Females tend to experience poorer health than males (especially if one focuses on health being very good or excellent). This may be considered to be at odds with the overall fact that Indigenous females

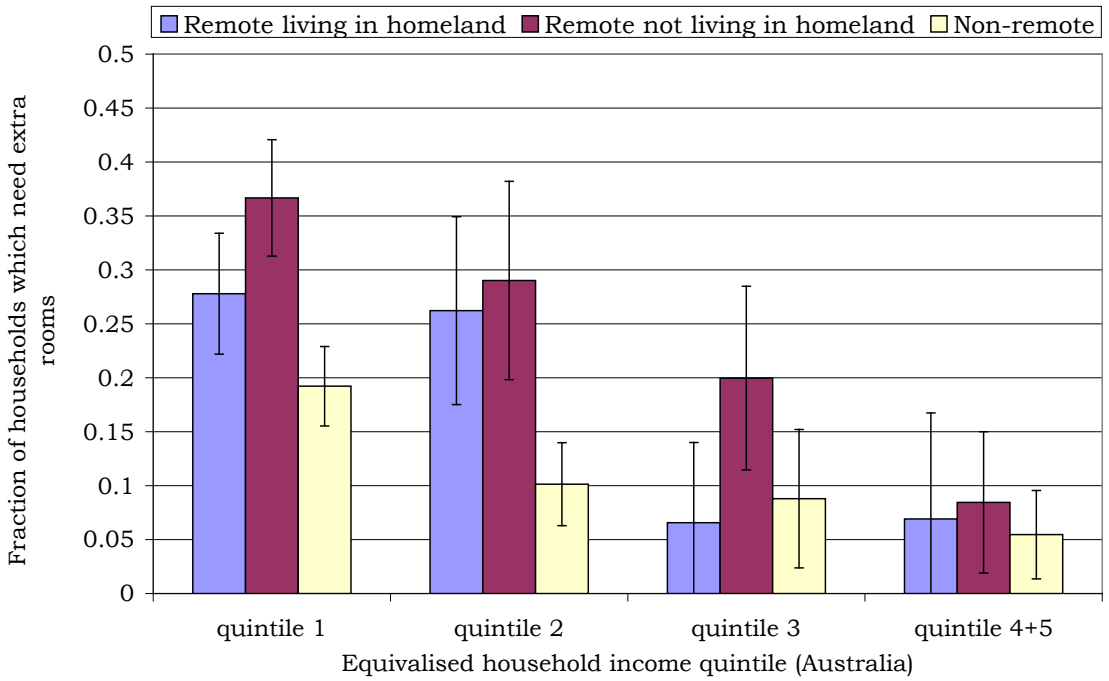
have higher life expectancy than Indigenous males and may indicate the subjective nature of self-assessed health status.

Education is strongly correlated with income, but it also can improve health outcomes by improving the capacities of the individual concerned with respect to acquiring and processing information about maintaining/improving health and avoiding disease and injury. Education is strongly associated with self-assess health status in non-remote areas, but the evidence is more equivocal for remote areas. In terms of the highest level of educational attainment, fair or poor health is not correlated with education in homelands and is only weakly correlated with having a bachelor degree (i.e., as significant protective factor at the 10% level). Having a bachelor degree in remote homeland area is positively significantly correlated with very good or excellent health at the 5 per cent level, but is not correlated with any other education variables in other remote areas. The relatively weak correlation of education in remote areas is consistent with the lack of an observable income gradient in the data. Before providing a richer description/characterisation of homelands and other remote areas, it is worth briefly reflecting on why education might only be weakly correlated. One explanation is that Indigenous educational outcomes in remote areas are poorly measured or only weakly correlated with the skills acquired by most other Australians at educational institutions. This may reflect the quality of educational inputs as well as the quality of educational outputs—that is, school infrastructure and teaching may not be optimal in many remote areas. Another issue may be the lack of culturally appropriate provision of educational instruction, resources and curriculum. For whatever reason, education is not uniformly correlated with health status. It may not be a coincidence that the only educational outcome that is correlated with health is having a bachelor degree, as tertiary qualification are quality controlled and usually provides a credential that ensures some high-level general skills have been attained by the individual in question.

Figure 7 and 8 identify some housing characteristics that are sometimes associated with poor health outcomes: overcrowding and structural problems with the dwelling. If overcrowded housing is measured in terms of households needing extra rooms (relative to the occupancy standard used by the ABS), there is a marked income gradient in both remote and non-remote areas. Perhaps the most surprising finding is that overcrowding is probably more evident in remote areas with the difference between the top and bottom income groups being more pronounced (larger) than in non-remote areas. This may be associated with differences between (possibly culturally-specific) housing norms and expectations. Notwithstanding, it is particularly noteworthy that the largest income gradients was in remote non-homeland areas. Indeed, in the bottom quintile dwellings were almost 10 percentage points more likely to be 'overcrowded' in remote non-homeland as opposed to remote homeland areas. It should be fairly obvious that the lack of income gradients is not associated with the overcrowding in the households. Furthermore, the relatively good health status of bottom quintile households in remote homelands is NOT likely to be associated

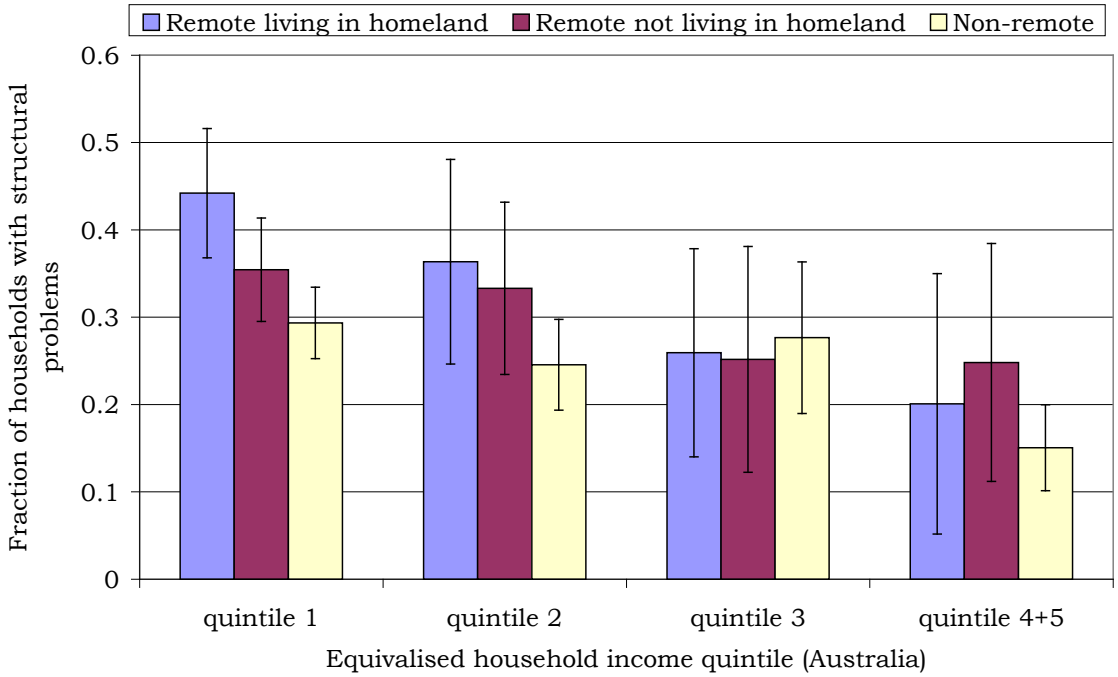
with overcrowding as the fact that over one-quarter of dwellings in such areas needs more rooms should be reducing health status relative to the other income groups. However, overcrowding in remote non-homeland households may be worsening health outcomes vis-à-vis homeland households, especially in the bottom quintile of income.

Figure 7. Income gradients for overcrowded households



Income gradients are less marked in remote areas for structural problems with dwellings. However, there are some broad differences in such problems between income groups is significant for homelands and non-remote dwellings, although the differences are mote marked for the remote homeland areas. For example, almost 45 per cent of homeland housing had structural issues in the bottom quintile—almost 50 per cent higher than non-remote dwellings where less than 30 per cent had such problems. Again the relatively poor housing stock in the low income group in homeland areas is unlikely to explain the relatively good health outcomes for such households.

Figure 8. Income gradients for structural problems with housing



The next three slides examine some cultural factors broadly defined. Speaking an Indigenous language is a robust measure that sends a strong signal about cultural attachment (Dockery 2009). Consistent with the introductory discussion about homelands, cultural attachment as indicated by the Indigenous language data is significantly higher in remote areas than in non-remote areas and highest of all in homeland areas (Figure 9). There is a marked income gradient in Indigenous language with low income groups being most likely to speak a language at home. If one argues that speaking an Indigenous language is associated with difficulties in accessing health services (often provided by English speakers), then this finding would predict that there was a substantial income gradient in health for both homeland and other remote areas. However, this is not the case and indeed, health status is unexpectedly high in low income homeland households (at least according to the dominant theoretical paradigm). Given that economic activities are relatively circumscribed in homeland and other remote areas, Figure 9 clearly illustrates a trade-off between cultural attachment and material well-being.

Figure 9. Income gradients for Indigenous language

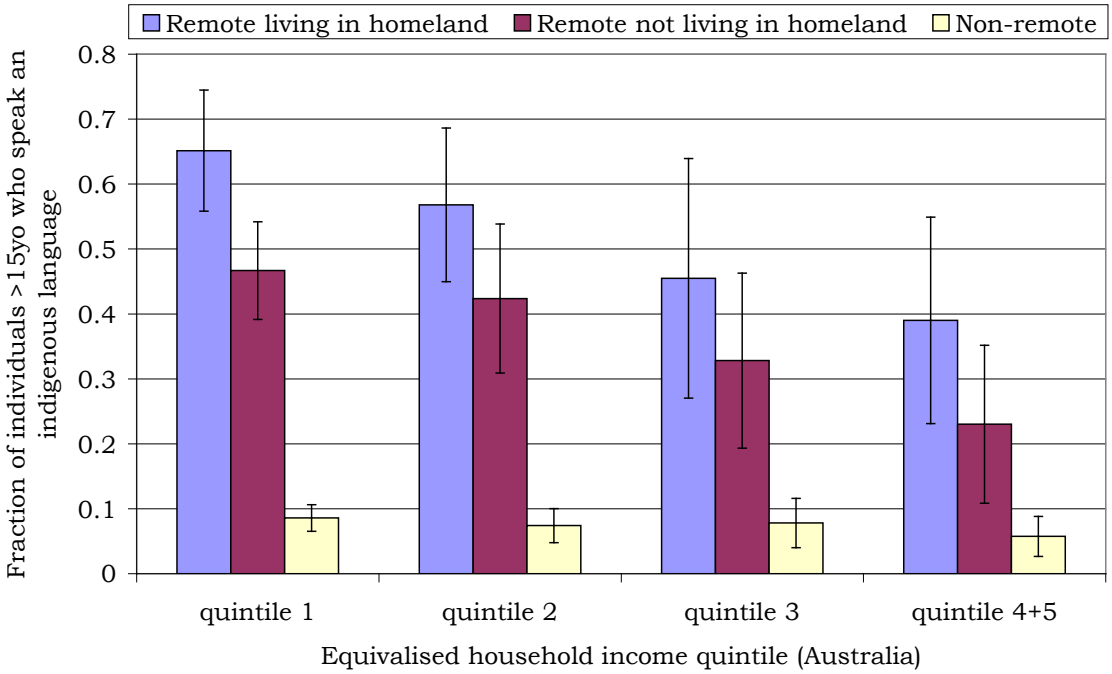
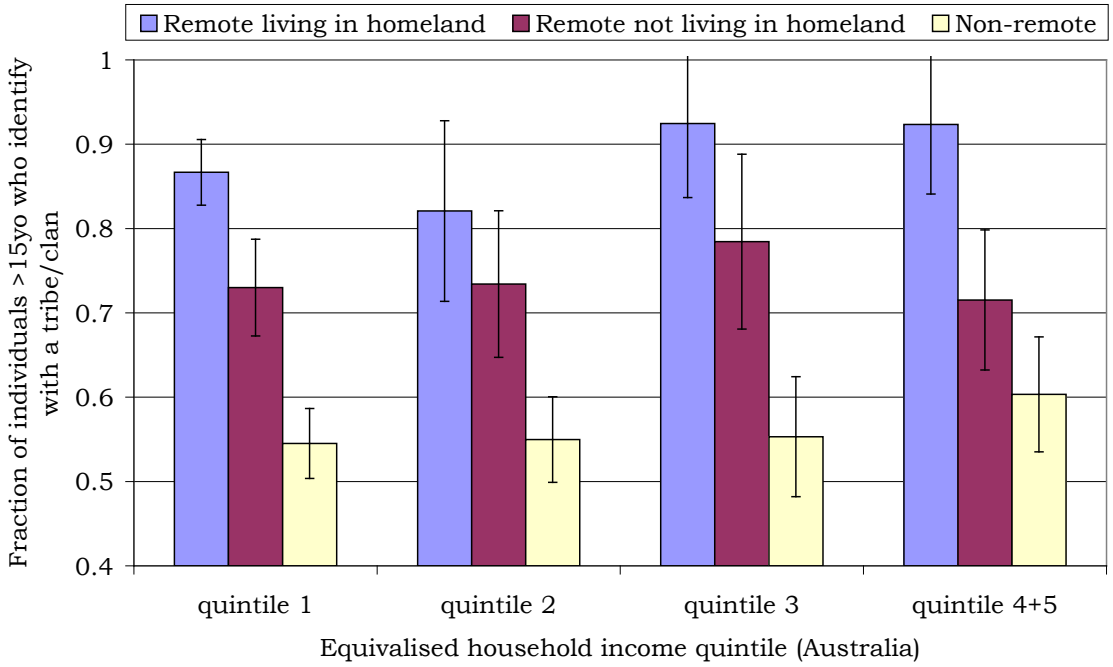


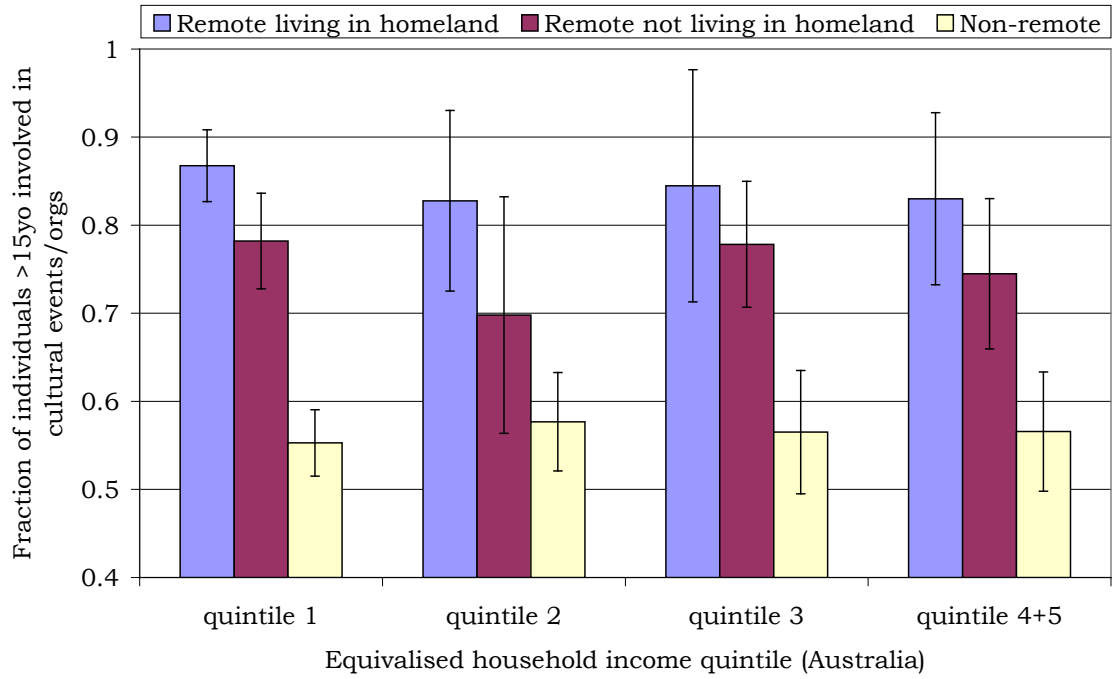
Figure 10 presents another proxy for culture, whether an individual identifies with their tribe or clan. There is no significant systematic income gradient in any of the areas examined. This may reflect that the identification with tribe or clan is a subjective process. However it is likely that there was some or cultural content (or rather 'ontological' information) in the data as homelands have higher identification than non-homeland respondents who in turn have higher rates of identification than non-remote individuals. In contrast to the above, the lack of an income gradient in remote areas is consistent with the lack of an income health gradient. The lack of an income gradient in Figure 10 for non-remote areas probably means that it is not a major factor underlying Indigenous health at least in terms of driving the existence or otherwise of social gradients.

Figure 10. Income gradients for identifies with clan



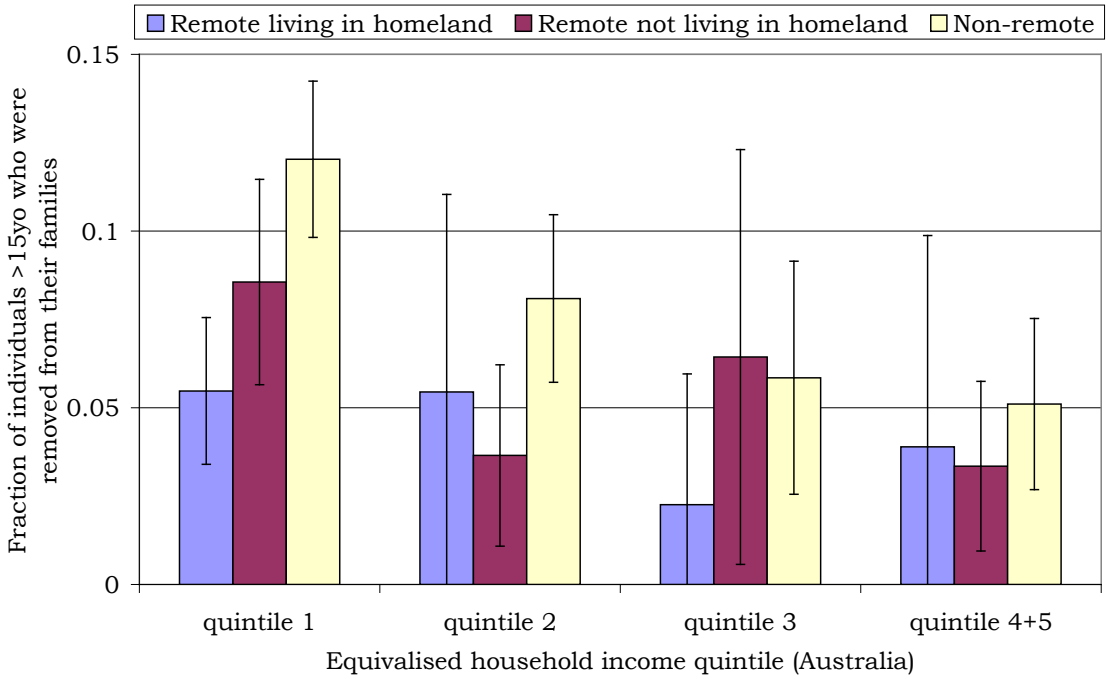
Arguably, another aspect of 'culture' is the extent to which an individual is involved in cultural events or organisations—even though this might also be associated with a particular form of social capital (Hunter 2004). Note that again there is no evidence for an income gradient in Figure 11, which may reflect either that cultural involvement is not an important driver of income gradients in health in non-remote areas. Having said that, the patterns in cultural involvement in homeland and other areas is (again) consistent with the characterisation of such areas above.

Figure 11. Income gradients for involved in cultural groups



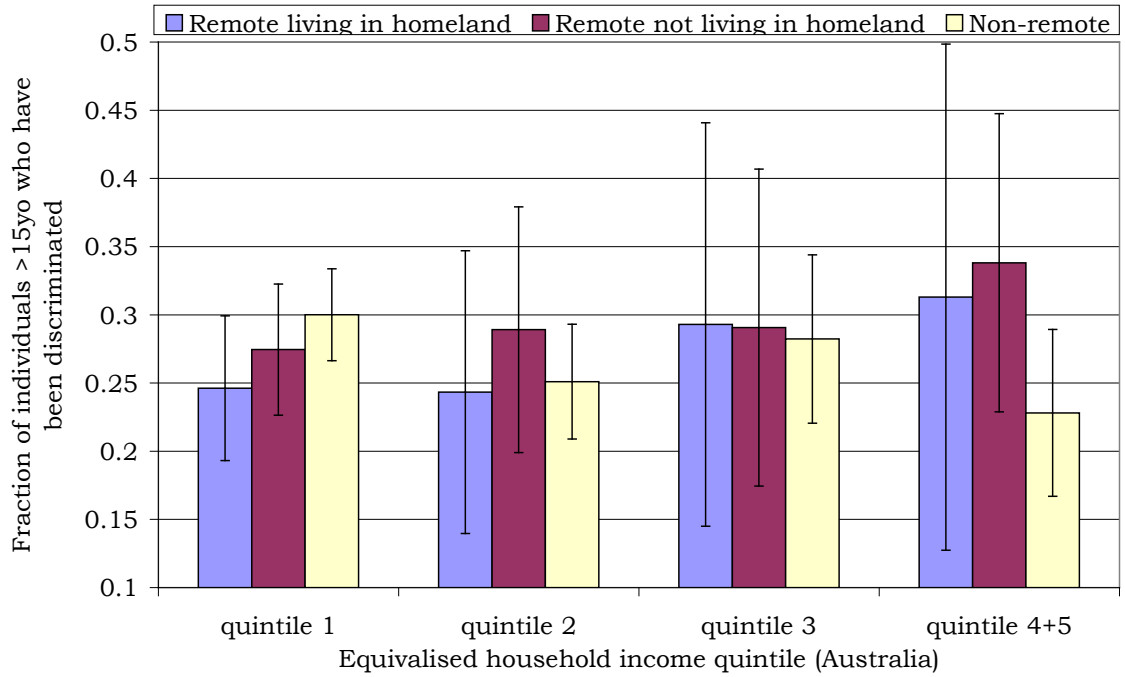
Before moving to non-cultural factors entirely, it is worth reviewing the patterns of being removed from one's natural family as a child, sometimes characterised as being a member of the stolen generation, by broad income group. There is a clear income gradient in this form of social and cultural disruption in non-remote area, but no clear gradient for the remote areas. While this is symmetrical with the income gradients in health, it should be acknowledged that it does not directly effect many individuals with generally less than 10 per cent having been removed. In the bottom quintile households, homeland respondents are less likely than other remote respondents to have been removed, who are significantly less likely than non-remote respondents to have been removed. This pattern is consistent with the early disruption in the family life, as embodied in removal from one's family, being a risk factor associated with poor health outcomes.

Figure 12. Income gradients for removed from family



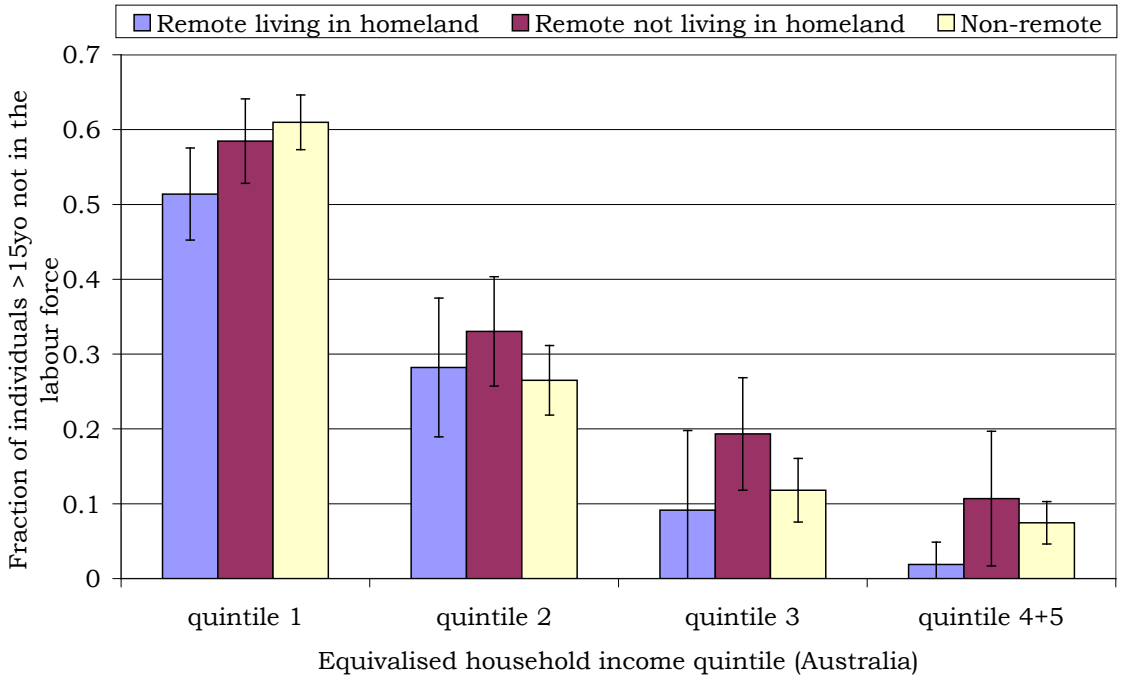
Social stress is one of the key modes of transmission to poor health outcomes driving income gradients according to the social production of disease theory. The experience of discrimination is likely to one of the key stresses inducing poor health outcomes and as Figure 13 illustrates it is all too commonly experienced by over one quarter of Indigenous people aged over 15 irrespective of their income group. This finding is reasonably robust whichever geographic area a respondent resides. That is, even though bottom quintile respondents are significantly more likely than certain high income groups in non-remote areas to experience discrimination, the difference is not large and is unlikely to completely explain the income gradient in health for such areas. It certainly does not explain the relatively good health outcomes in homeland areas in the bottom quintile group as homeland, other remote and non-remote do not experience different levels of discrimination when one conditions of having low incomes.

Figure 13. Income gradients for discrimination



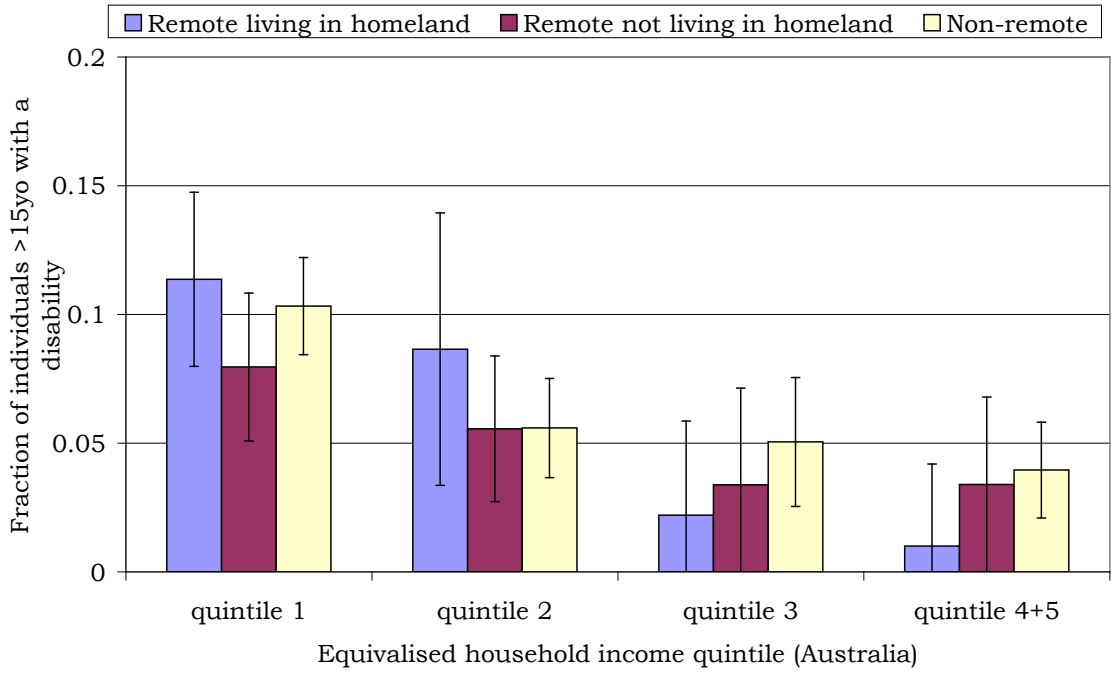
Hunter and Gray (2001) identify discrimination as one albeit potentially important factor in Indigenous people choosing not to participate in the local labour market. Of course, if there is no established labour market or the prospects for employment are limited, then it is perfectly understandable that one might nominate oneself as not in the labour force (with the commonly used acronym of NILF). In effect this means that a person indicates that they are unemployed if they do not have a job—however, the NILF respondents may or may not have income support payments depending on their choices and their recent history of interactions with welfare authorities and the employment status of other family members. Figure 14 illustrates a strong income gradient in NILF in all three geographic areas. Clearly, nominating one's status as NILF is not responsible for the lack of an income gradient in remote health.

Figure 14. Income gradients for NILF



One of the factors associated with NILF is that an individual has a disability that requires assistance. Figure 15 documents a clear income gradient with low income respondents being more likely to have a disability. Indeed in the bottom quintile, homeland respondents are more likely to indicate that they need assistance than other remote respondents (significant albeit a difference of only a few percentage points). If one assumes, quite reasonably, that the people who need assistance will nominate their health as fair or poor, then this finding contradicts the better health outcomes in low income households in homelands compared to other areas. The number of people with a disability is small it does not affect the overall result.

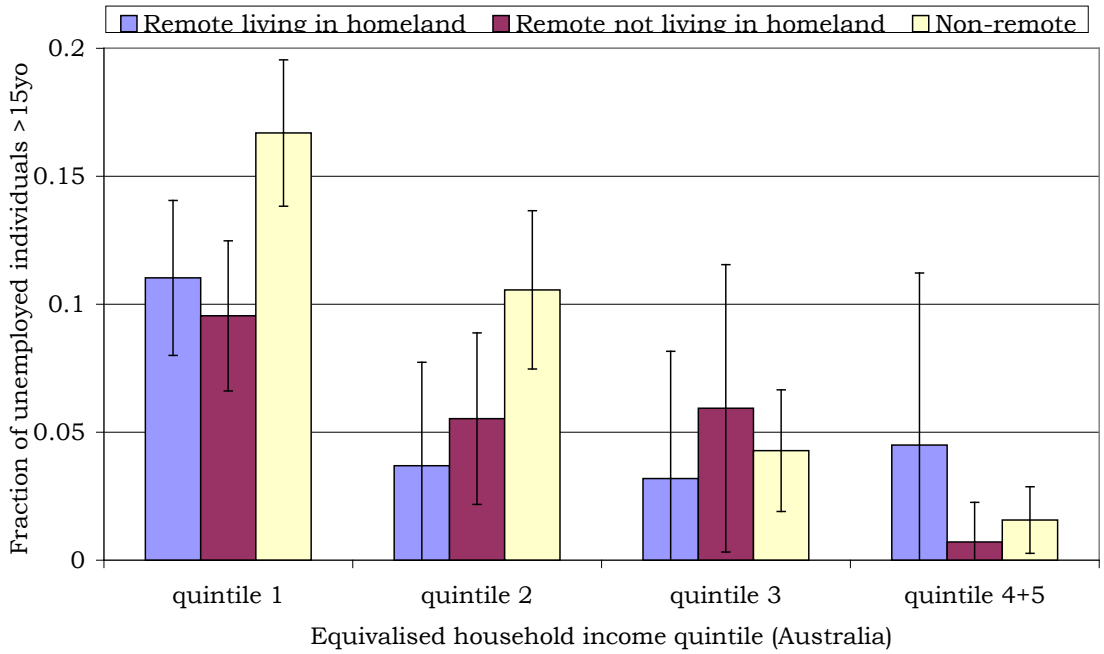
Figure 15. Income gradients for disability



Note: This figure is based on the DSTAT which is designed to facilitate remote/non-remote comparisons of disability status. A person (aged 15 and over is classified as disabled if they either 'Has profound or severe core-activity limitation' or 'Has unspecified limitation or restriction'.

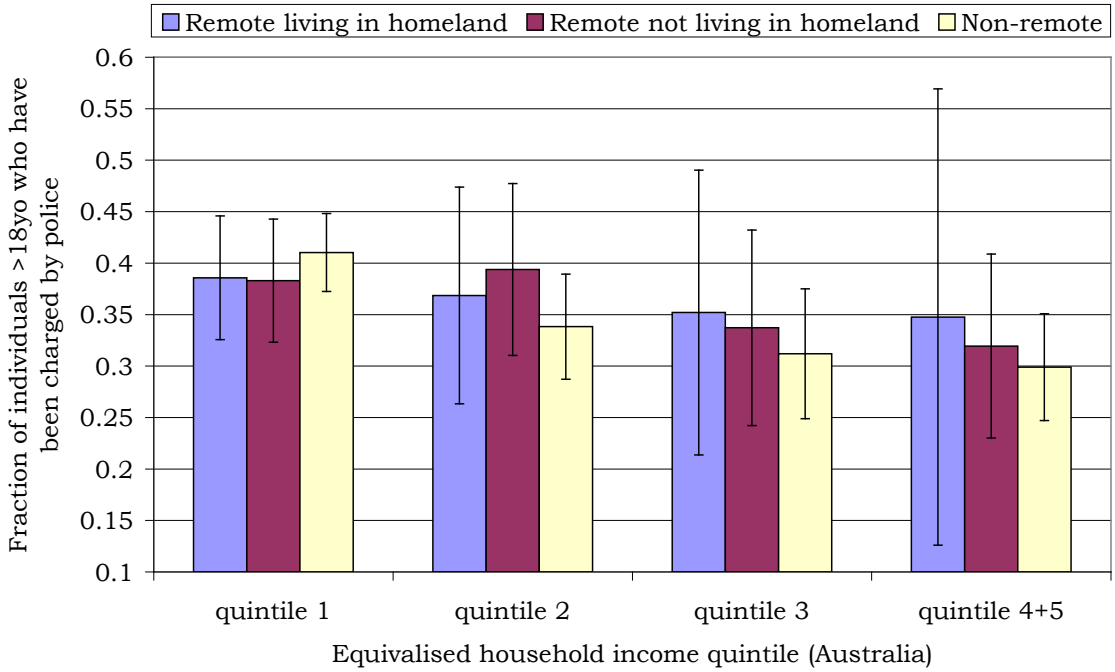
Returning back to labour force status, it is clear that low income groups are more likely to be unemployed than high income groups in all areas—although the income gradient in unemployment is more marked in non-urban areas. Unemployment is often associated with poor health outcomes in the literature (Hunter and Taylor 2002) and one should expect the patterns in Figure 16 to reinforce whatever health gradients exists in the respective areas. Again, the failure to observe an income gradient in remote health is highlighted.

Figure 16. Income gradients for unemployment



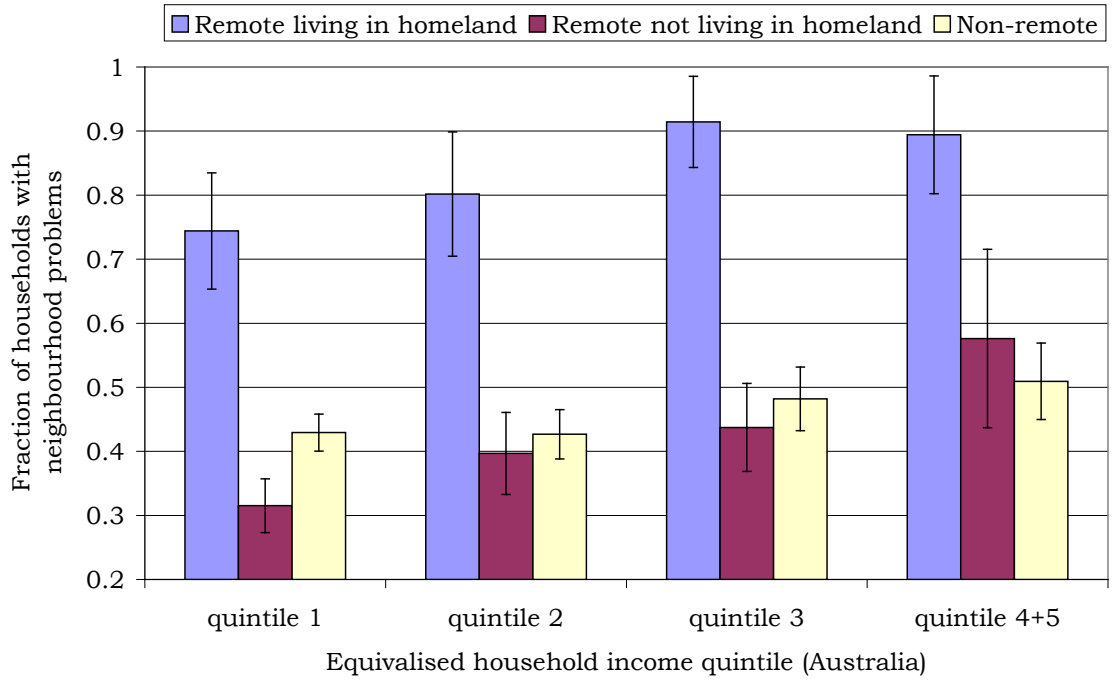
Interactions with the criminal justice system are a clear indication of social exclusion with around 40 per cent of NATSISS respondents indicating they have been ever charged by police. This is indicative of a level of stress, if not disruption, that may manifest itself as health issues if the theories about social production of disease have merit. Figure 17 illustrates that there is no significant income gradient in ever having being charged by police. The lack of a gradient is consistent with the patterns of self-assessed health status in remote areas. It is more difficult to identify an income gradient in being charged in non-remote areas but the low income group is about 10 percentage points more likely to be charged in such areas compared to the top quintile group. This relationship does not indicate that there is a causal relationship between being charge with a crime and lower self-assessed health.

Figure 17. Income gradients for charged by police



Finally, Figure 18 reports the reportage of neighbourhood problems in the local community (referred to as neighbourhood problem as a shorthand despite an arguably urban connotation in the word neighbourhood the question does refer to community as well). In contrast to prior expectations neighbourhood problems are actually more likely to be reported by high income groups in the three geographic categories. This is noteworthy in itself in that it would undermine any income gradient in health in that stress could reasonably be associated with neighbourhood problems. The remarkable point about this figure is the high incidence of neighbourhood problems in remote homeland areas with between three-quarters and nine-tenths of respondents indicating there were some neighbourhood problems—substantially higher than in other remote or non-remote areas.

Figure 18. Income gradients for neighbourhood problem



Notes: Neighbourhood or community problems are asked in the context of crime justice and safety component of the 2008 NATSISS questionnaire. The problems identified are clearly serious for any family including: theft (incl. burglaries, theft from homes, motor vehicle theft, other theft), problems involving youths, such as youth gangs/ lack of youth activity, prowlers/loiterers, vandalism/ graffiti/ damage to property, dangerous or noisy driving, alcohol, Illegal drugs, family violence, assault, sexual assault, problems with your neighbours and personal safety.

In summary, above description of homeland areas is indicative of substantial level of social exclusion in such areas and a general lack of local socioeconomic opportunity. Given the high levels of social exclusion in homeland areas, it is not surprising that there is little evidence for income gradients in remote areas, especially homeland areas. The relatively good health outcomes in low income homeland households appear to be at odds with these observations. The level of neighbourhood problems is remarkable and highlights that these health outcomes are being achieved in what many (including numerous local residents) as dysfunctional communities. By default we are left with the impression that living on country does have substantial health benefits. These benefits are most marked for low income households for whom extra income cannot facilitate access to health services that may be some distance away. However, it seems likely that there is some sort of trad-off between material and non-material health benefits from living 'on country' as one has to endure inadequate housing, poor economic prospects and outcomes, and ongoing community safety issues to avail oneself of these 'spiritual' benefits.

The next section turns to recent evidence about maternal and child health data from LSIC to provide slightly more disaggregated understanding of arguably crucial health relationships that may underlie future health outcomes as children grow into adult hood (especially if the Barker hypothesis has some merit).

The main geographic identifier in LSIC that will be used in the following analysis is the 'Level of Relative Isolation' (LORI). The majority of children in the LSIC sample live in areas classified as having none or only low levels of relative isolation, as shown in Table 2. The characteristics of the children and the child's mother (if mother is P1) are shown in Tables 2 and 3.

Table 2. Characteristics of the study child

	Freq.	%
Age in years		
0	230	14
1	667	40
2	75	4
3	194	12
4	459	27
5	52	3
Indigenous status		
Aboriginal	1,467	87
Torres Strait Islander	109	7
Both	101	6
General health status		
Excellent	757	45
Very good	522	31
Good	341	20
Fair	48	3
Other	9	1
Underweight at birth		
No	1,230	73
Yes	172	10
Information missing/unavailable	275	16
Level of relative Isolation (LORI)		
None	435	26
Low	839	50
Moderate	214	13
High/Extreme	189	11
Total	1,677	100

Table 3. Characteristics of the child's mother (if mother was P1)

	Freq.	%
Indigenous status		
Aboriginal	1,146	74
Torres Strait Islander	100	6
Both	62	4
Neither/Other	238	15
Employment status		
Employed	463	30
Not employed	1,073	69
Permanently unable to work	1	0.1
Retired	1	0.1
Refused/Other	8	0.5
Religion		
No religion/atheist/agnostic	407	26
Anglican/Church of England	242	16
Uniting church	91	6
Baptist	20	1
Lutheran	36	2
Assemblies of God	37	2
Church of Christ	32	2
Aboriginal Inland Mission	25	2
Other Christian	127	8
Aboriginal or TI spirituality	56	4
Other religion	37	2
Refused/Don't know	57	4
Money earned after deductions		
< $150 a week (<$300 a fortnight)	134	9
$150 - $249 a week ($300-499 a f/n)	204	13
$250 - $399 a week ($500-799 a f/n)	261	17
$400 - $599 a week ($800-1199 a f/n)	315	20
$600 - $799 a week ($1200-1599 a f/n	207	13
$800 - $999 a week ($1600-1999 a f/n)	128	8
$1,000 or more a week ($2,000+ a f/n)	200	13
Missing/refused/don't know	97	6
Total	1,546	100

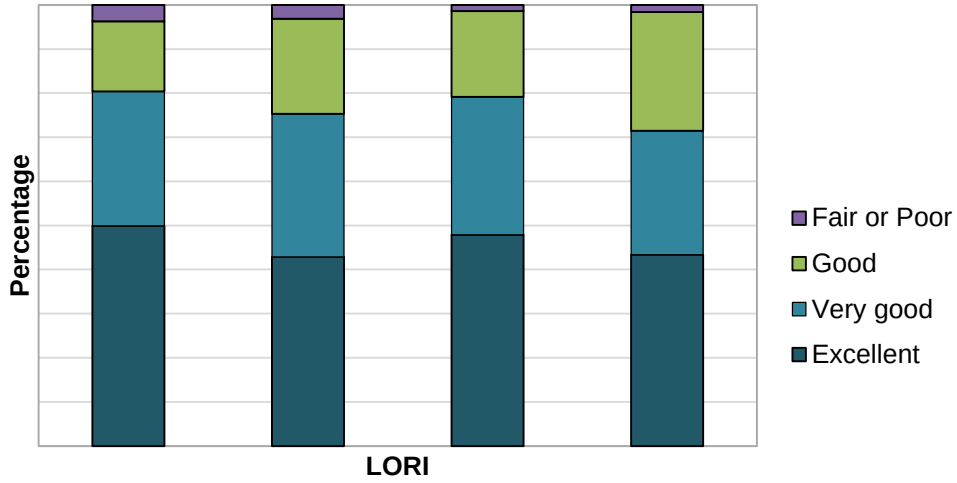
General Health

Two general health measures are available in the data. The first one asks the main respondent to rate the health of the study child, and is available for all 1,677 children (although responses were either missing or refused for 9 children). The second general health measure refers to the main respondent. Here we only look at cases where the main respondent is the natural mother (1,546).

Children's general health status, by LORI

The primary respondents (P1) were asked to rate the health of the study child. Overall the health of the children was rated very favourably with three quarters rating the childrens' health as 'Excellent' or 'Very good'. There were some geographical differences in terms of the ratings; the percentage of children whose health was rated as 'excellent' or 'very good' was lowest in areas of high or extreme isolation (71%) and highest in areas with no isolation (80%). While significant, the association between a child's general health status and LORI was very weak, as shown in the diagram below (and Appendix table A2).

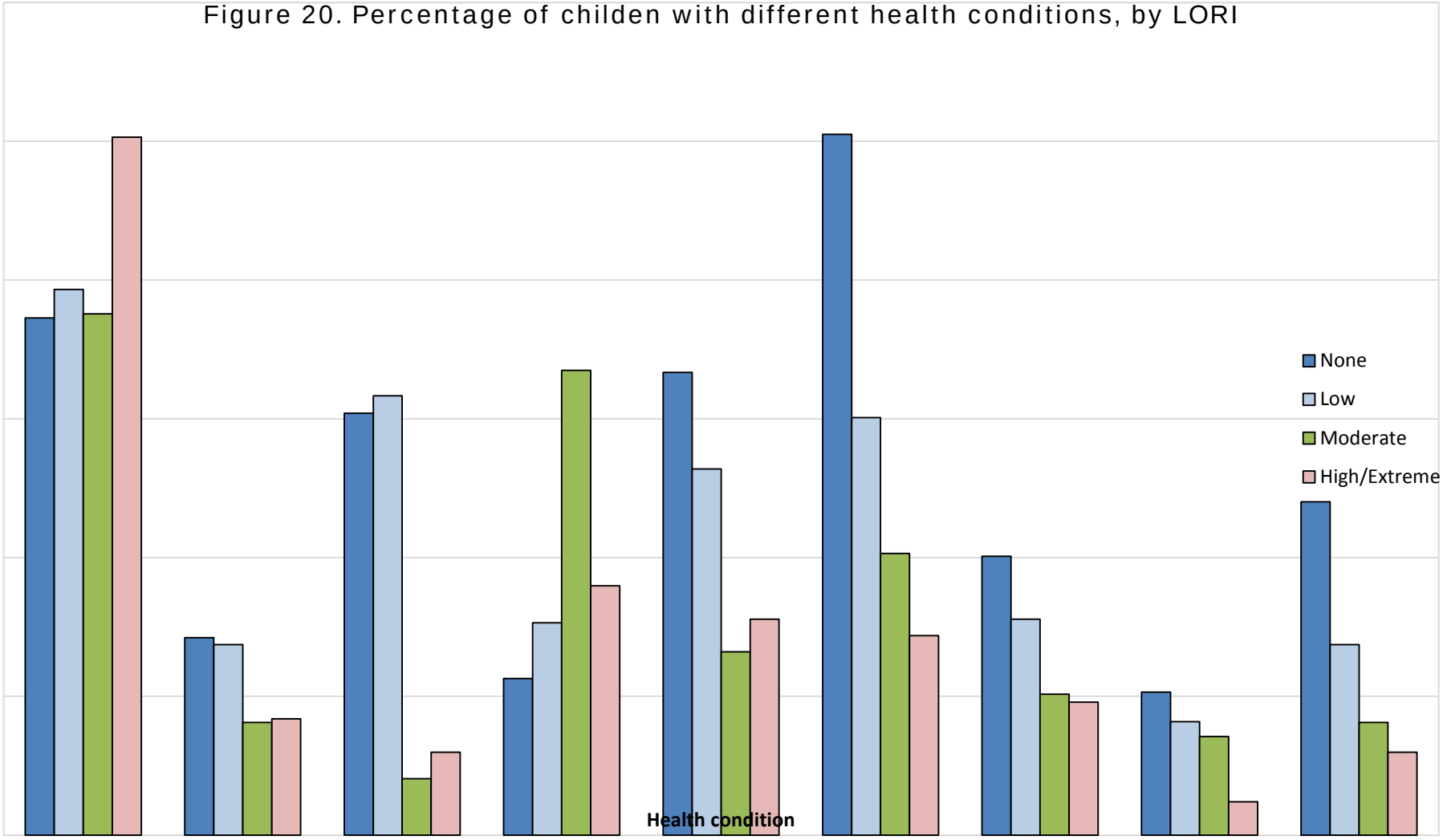
Figure 19. Child's general health (as rated P1), by LORI



In addition to an overall general health status question, questions were asked about specific health conditions the child *has ever had*. In some ways these questions may present a more accurate picture of children's health as they would be less likely to be influenced by subjective interpretations of health.

Figure 20 shows the percentage of children who have ever had a specific health condition by LORI. The stars represent the significance level, as tested using a chi-square test. For some conditions such as eczema, asthma, chest infections and 'other' health problems there was a significant difference by LORI, with a higher reported percentage for children living in areas of no or low levels of isolation. However, this effect could have been caused by a number of different factors, including a greater awareness of different health conditions in less remote areas.

Figure 20. Percentage of childen with different health conditions, by LORI



Multivariate models predicting child health by LORI

To investigate the determinants of general health, as well as of the specific health conditions a series of logistic regressions were run for general health, as well as for five specific health conditions which were shown to be significantly associated with LORI in the bivariate analysis (eczema, skin infections, asthma, chest infections and other conditions).

		Dependent variable	
		1	0
Model 1	General health rating	Child has 'good', 'fair' or 'poor' health	Child has 'excellent' or 'very good ' health
Model 2	Eczema	Has ever had eczema	Has never had eczema
Model 3	Skin infections	Has ever had a skin infection	Has never had a skin infection
Model 4	Asthma	Has ever had asthma	Has never had asthma
Model 5	Chest infections	Has ever had a chest infection	Has never had a chest infection
Model 6	Other	Has ever had other health conditions	Has never had other health conditions

A number of independent variables are included in the model, including characteristics of the child, and of the home environment.

- **Characteristics of the child:** Age, Sex
- **Characteristics of the home**: Home needs repair, Anyone smokes in the house
- **Socio-economic status:** Income earned after deductions
- **Geography:** Level of relative isolation

In addition, for each health outcome, a second series of models was run which included some information about the mother's behaviour during and after the pregnancy which could have impacted on the child's current health. These models were run for a subsample of children where the mother was the primary respondent.

Prenatal and post natal factors:

- Mother smoked during pregnancy
- Mother drank during pregnancy
- Whether child was breastfed

The results of the models are shown in Appendix table A2.

The Level of relative isolation was a significant predictor in all child health models. In general, compared to urban areas, children living in areas of greater isolation were *more likely* to have worse health, and skin infections (significant only for areas for moderate isolation). The pattern for skin infections appears to be in line with evidence from other research. For example, based on clinical examinations of children aged 8-14 living in the

Northern Territory, Mackerras et al (2003) found that children living in remote communities were significantly more likely to have infected skin sores and scabies compared to their urban counterparts.

Compared to urban areas, children living in areas of greater isolation were *less likely* to have eczema, asthma, chest infections and other conditions. With regards to asthma, the higher likelihood of having ever had this condition in urban areas also appears to be in line with other research (Dawson 2004). However, it is difficult to ascertain the nature of any geographic differences in asthma among Indigenous children because of the lack of standard methodologies and measurement instrument used by previous research (see Dawson 2004 for a review) and studies such as LSIC, which use self-reports may lead to less accurate results compared to studies based on clinical measurement (Dawson 2004).

A variety of other factors also influenced the prediction of health.

Age

- When looking at the subjective general health question children aged 3-5 were significantly more likely to be rated as having worse health compared to children aged 1-2.
- Having ever had asthma was also significantly associated with age, with the odds increasing with the child's age.
- Age was not significant in any of the other models.

Sex

- Female children generally had lower odds of being in worse health, and of having specific health conditions compared to males. However sex differences were only significant for asthma and chest infections.
- A higher likelihood of asthma among young boys compared to girls has also been found by previous research (Australian Centre for Asthma Monitoring 2008; Poulos et al 2005).

Home needs repair

- The variable representing whether the home needs repair was included as a proxy for poor housing conditions. Poor housing conditions including crowding, pests, and inadequate water supply and facilities for the removal of human waste can contribute to a number of health conditions including skin infections (Tong et al 2008; Bailie et al 2005).
- Children living in houses which did not need repair were less likely to have skin infections, although this effect was only significant at the 10% level, on only in the model not including prenatal and postnatal factors.

Income

- Income was an important predictor in a number of the models.

- For the first model predicting relatively poor general health, children living in with a primary respondent who has an income of 600 dollars or more a week (includes partner's income if a partner exists) are less likely to have a child that is in 'good', 'poor' or 'fair' health.
- They are however also more likely to have a child with eczema and chest infections. This could be due to the fact that individuals with higher incomes are more likely to visit doctors or health clinics often, and therefore their child might be more likely to be diagnosed for different conditions. Otherwise it could be due to measurement errors in income as specified in these models.

Whether anyone smokes in the house

- This variable was not significant in any of the models

Smoking and drinking during pregnancy & breastfeeding

- These variables appeared to have little importance in terms of predicting whether children had ever had any of the listed conditions.

Mother's general health status, by LORI

The mother's self-reported general health status had a greater degree of variability in terms of responses, compared to the children's.

As with the children's general health, although the association between health and LORI was significant, it was relatively weak (Appendix table A4). The percentage who reported their health as being 'excellent' or 'very good' was highest among mothers living in moderately isolated areas (Figure 21).

Figure 22 shows the percentage of mothers who have ever had a specific health condition by LORI. The stars represent the significance level, as tested using a chi-square test. For some conditions such as ear infections, asthma, and 'other' health problems there was a significant difference by LORI, with a higher reported percentage for mothers living in areas of no or low levels of isolation except for ear infections where a linear pattern was found with greater isolation associated with greater prevalence of ear infection.

Figure 21. Mother's general health, by LORI

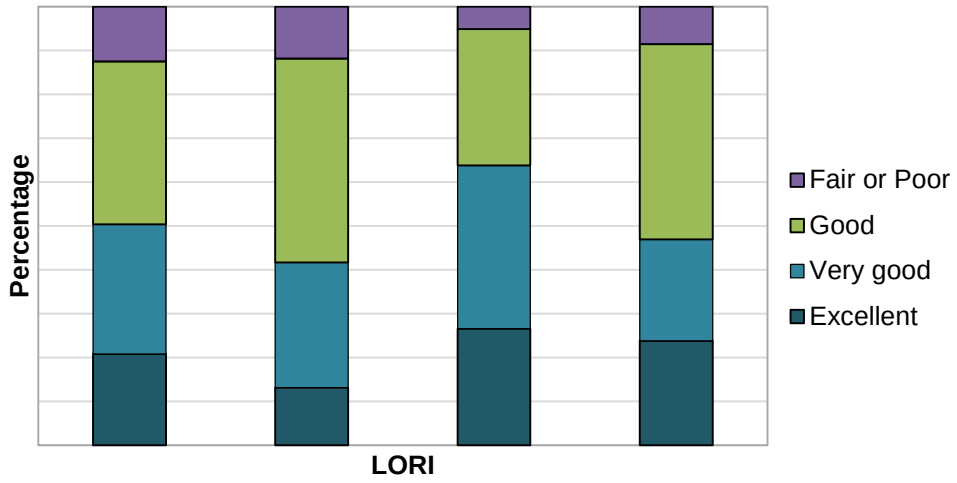
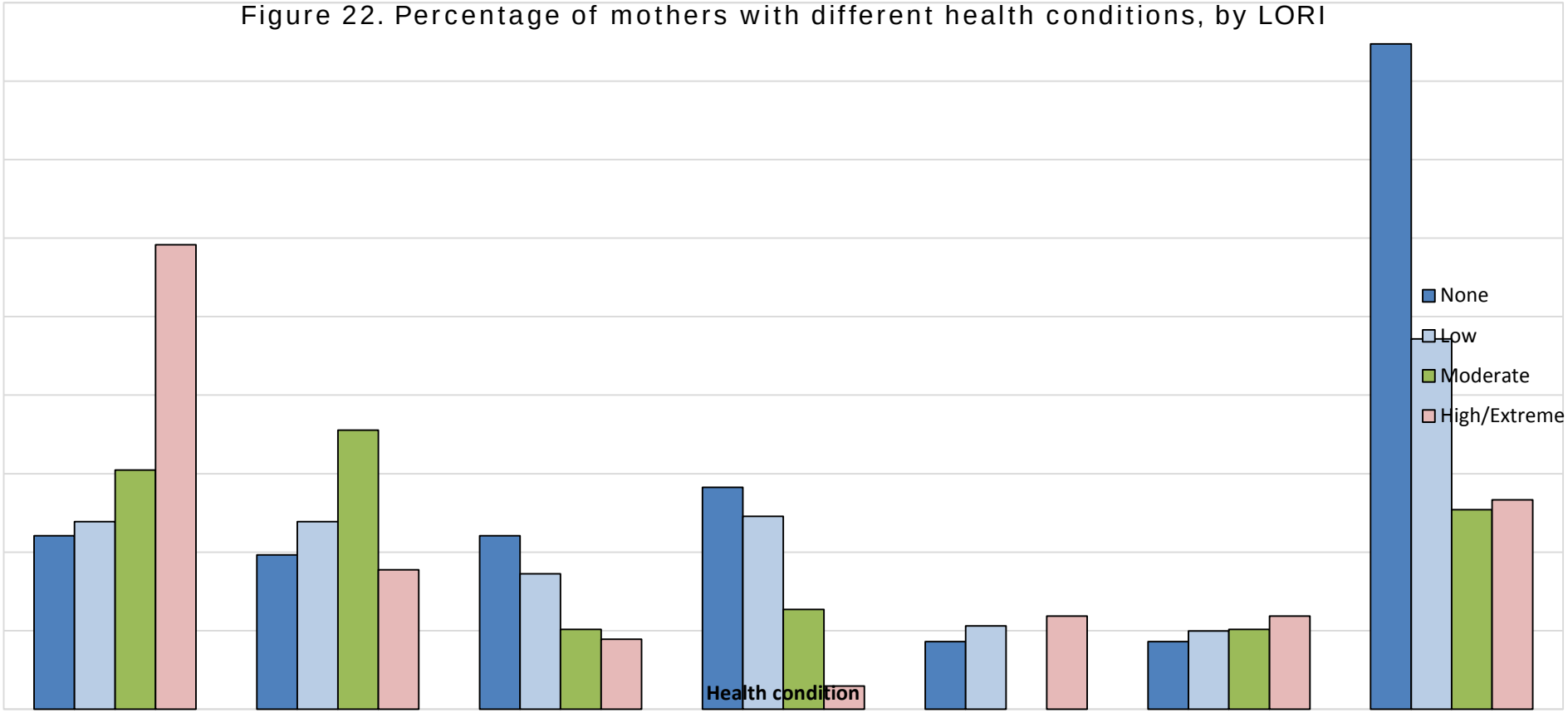


Figure 22. Percentage of mothers with different health conditions, by LORI



Tobacco and alcohol use

Smoking and drinking can impact the health of both mothers and their children. The literature reviewed above suggests that smoking and drinking are lower than in other geographic areas and therefore their impact on the health of the population would be reduced. The following sections explores current smoking for the mother and smoking and drinking during pregnancy.

Current smoking

According to a recent report by the AIHW (2011) in 2008 around half of Indigenous adults aged 18 and over were current smokers (49.9%). This rate is more than double the rate of non-Indigenous people. Their analysis of smoking rates, based on the ABS National Aboriginal and Torres Strait Islander Social Survey (NATSISS) also found that the percentage of the population that was classified as smoking daily was higher in very remote areas (51%) as compared to major cities (46%).

In LSIC, the percentage of mothers who were currently smoking was very similar to the percentages reported from NATSISS.

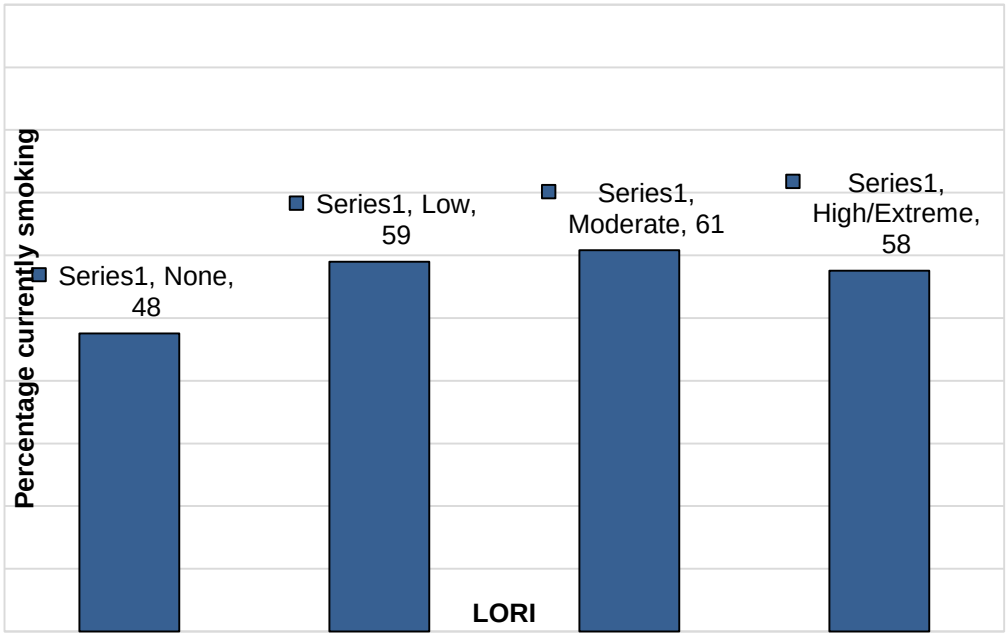
- 51 per cent of mothers were currently smoking
- an additional 5 percent of mothers smoked occasionally (casual or social smoker).

Occasional and frequent smokers were grouped together, and a bivariate analysis using a chi-square test was used to examine whether the percentage of mothers who smoked varied by remoteness (Figure 23).

The chi-square test (chi2[3]=16.63, pr<0.05) indicated that there were significant differences in the percentage who smoked by remoteness, although the association was relatively weak.

The largest difference appeared to exist between mothers living in areas with no remoteness (48% currently smoking) as compared to mothers living in all other areas.

Figure 23. Percentage of mothers currently smoking by LORI



Smoking and drinking during pregnancy

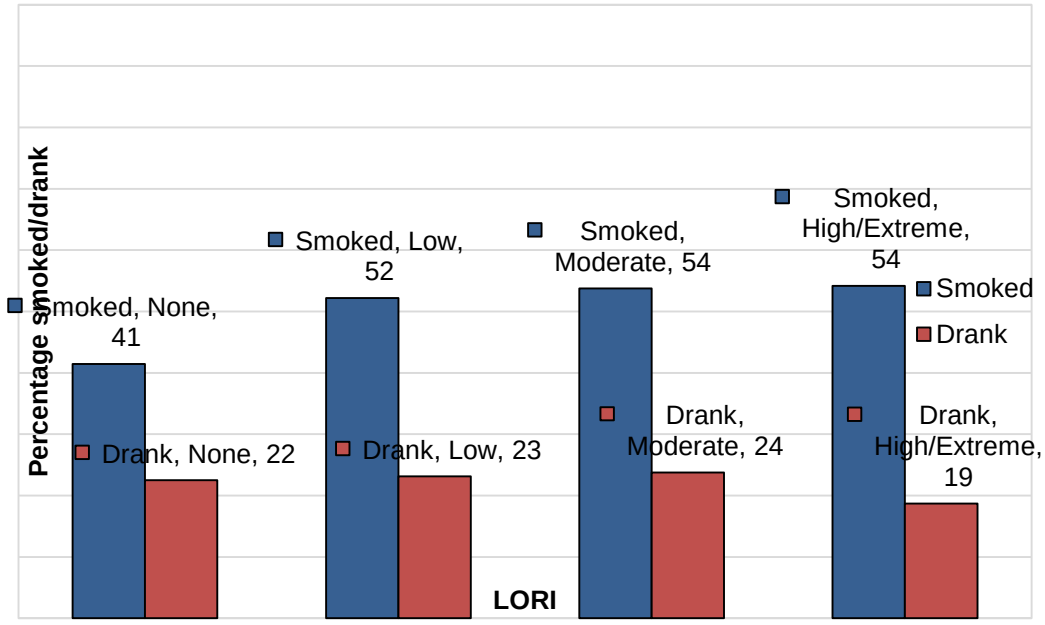
The AIHW (2011) report also highlighted the high rates of smoking during pregnancy among Indigenous women based on analysis of the National Perinatal Data Collection (NPDC). According to the report over half of the Indigenous mothers reported smoking during pregnancy (50.9%), compared with 14.4% of non-Indigenous women.

Again, the data from LSIC on smoking during pregnancy shows a very similar pattern. Overall 49.7 % of women smoked during pregnancy. In LSIC data is also available on drinking during pregnancy. Rates of drinking were considerably lower than rates of smoking; on average 23 percent of women reported drinking during their pregnancies.

The association between smoking during pregnancy and relative isolation mirrored the pattern seen above for current smoking rates. There was a significant, if weak, association ($chi2[3]=15.49$, $p<0.05$) with the lowest proportion found in areas with relative isolation (Figure 24).

In contrast to the geographic differences in smoking during pregnancy, there was no significant geographic variation in the percentage of mothers that drank during pregnancy.

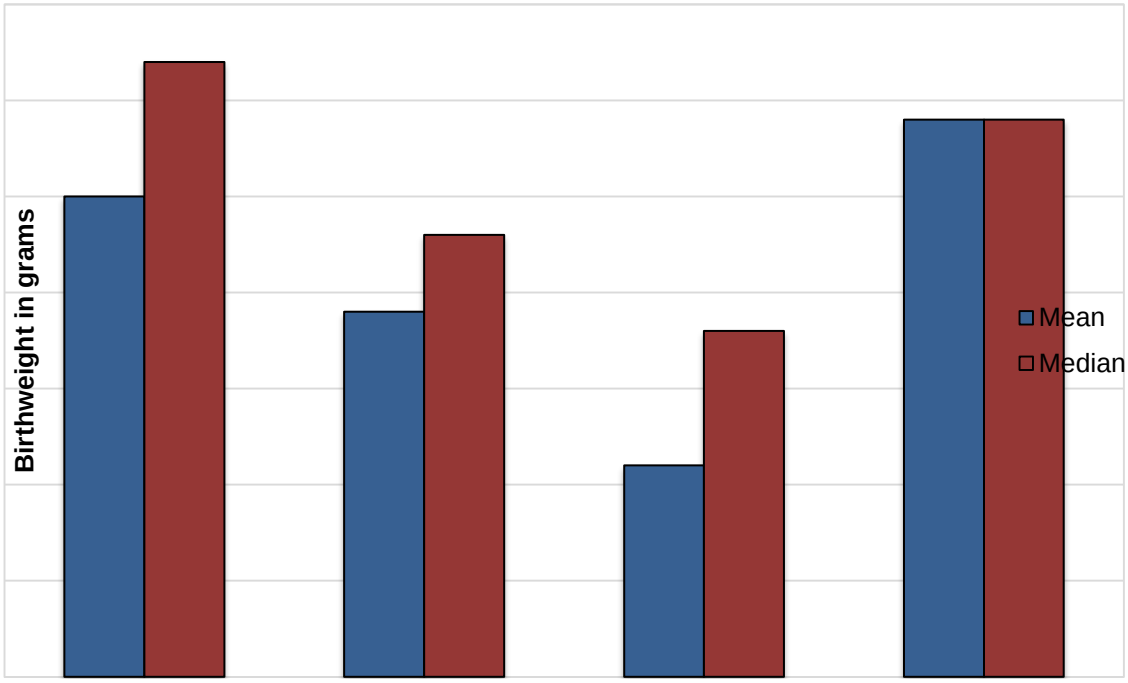
Figure 24. Percentage of mothers who smoked or drank during pregnancy, by LORI



Infant health

Two measure of infant health are explored here: birth weight and breastfeeding. Birth weight drops as isolation grows (Figure 25). However, babies born to women living in the high/extreme isolation areas have a higher average birth weight than women in less isolated areas.

Figure 25. Mean and median birth weight in grams, by LORI



To build a multivariate model using birth weight as a health indicator the variable was categorised into a dichotomous variable indicating whether the child was underweight at birth (<2500 grams) or not. The results (Table 4) indicate that older mothers 35+ are more likely than 25-29 year old to have a baby of low birth weight. Smoking is associated with low birth weight and as we previously found an association between both LORI and smoking and birth weight we controlled for a possible interaction effect between LORI and smoking on birth weight. The results indicate that there is a significant increase in the odds of low birth weight for mothers who smoked during pregnancy compared to those who didn't smoke during pregnancy in low or no isolation areas. In the moderate and extreme isolation areas this relationship was not significant.

Table 4. Logistic regression of child born underweight

	Model1	Model2
Age at birth		
<20	1.48	1.50
20-24	1.06	1.05
25-29 (ref)	--	--
30-34	1.3	1.33
35+	1.75**	1.82**
Level of relative Isolation		
None (ref)	--	--
Low	0.89	1.22
Moderate	1.4	2.60**
High/Extreme	0.74	1.15
Smoked during pregnancy		
No (ref)	--	
Yes	2.03***	
Interaction effects		
No isolation		
Did not smoke (ref)		--
Smoked		3.20***
Low isolation		
Did not smoke (ref)		--
Smoked		1.89**
Moderate Isolation		
Did not smoke (ref)		--
Smoked		1.13
High/Extreme isolation		
Did not smoke (ref)		--
Smoked		1.55
Number of observations	1,335	1,335

Breastfeeding is a measure that should not be influenced by availability or access in the same way as some other health indicators are. However, it is important to note that formula feeding, the alternative to breastfeeding, may be limited in remote areas due to affordability of formula, access to clean water and ability to sterilise equipment. This may increase the rates and length of breastfeeding in remote areas. According to the 2008 National

Aboriginal and Torres Strait Islander Social Survey, three-quarters (76%) of Aboriginal and Torres Strait Islander children aged 0–3 years had been breastfed (ABS 2009).

Findings from the NATSISS survey:

> "The survey found that indigenous children living in non-remote areas were less likely to be breastfed than children living in remote areas. Among children aged 0–3 years, 85% of those in remote areas and 73% of those in non-remote areas were currently or had previously been breastfeed in 2008. The proportion of Aboriginal and Torres Strait Islander infants aged less than six months who were currently being breastfed was more than one and a half times higher for those living in remote areas (77% compared with 45% of those who lived in non-remote areas).
>
> As well as having higher rates of breastfeeding, Aboriginal and Torres Strait Islander children in remote areas also tended to be breastfed for longer compared with children in non-remote areas. The median age at which breastfeeding stopped (for children aged 0–3 years who had been and who were not currently being breastfed) was 17 weeks for those living in non-remote areas and 36 weeks for those who lived in remote areas. Nearly one in four children who lived in remote areas (24%) stopped being breastfed at age 12–24 months compared with 13% of those who lived in non-remote areas."

Reported breastfeeding patterns in LSIC appear to follow the pattern described in NATSISS. Overall 80 percent of children had ever been breastfed, but the percentage ranged from 75 in areas of no or little isolation, to over 90 per cent in more remote locations (Table 5).

Table 5. Percentage of children ever breastfed, by LORI (column percentages)

Ever breastfed	None	Low	Moderate	High/ Extreme	Total
No	25	25	5	7	**20**
Yes	75	75	95	93	**80**
Total %	100	100	100	100	**100**
Total N	432	832	212	188	**1,664**

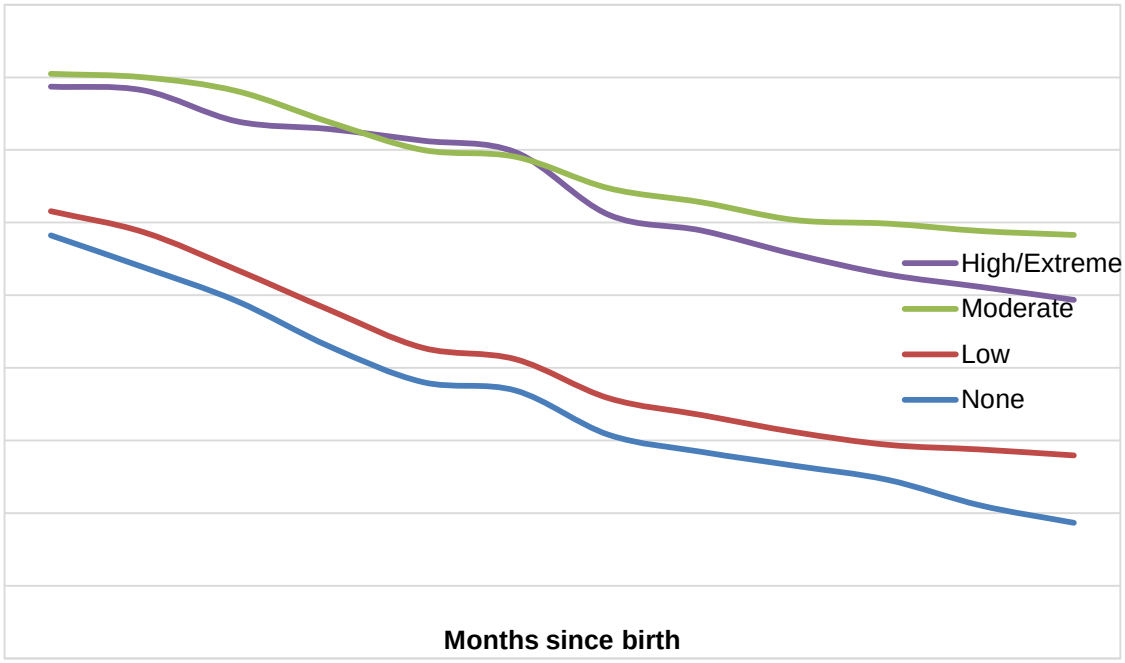
Multivariate analysis of breastfeeding shows a very strong pattern of greater breastfeeding in more isolated areas irrespective of age of mother, income and indigeneity of the mother (Table 6). Figure 26 shows that this pattern continues with women in more isolated areas breastfeeding for longer. Over half of women in areas classified as moderately or highly isolated breastfed for 1 year. By 6 months two-thirds of women in areas of no isolated had ceased breastfeeding.

Higher birth weights combined with more and longer breastfeeding suggest a greater chance at good health for indigenous infants in the most isolated areas.

Table 6. Logistic regression of whether child was ever breastfed

Age of mother at birth	
<20	0.86
20-24	1.21
25-29 (ref)	--
30-34	1.38
35+	0.85
Level of relative Isolation	
None (ref)	--
Low	1.31*
Moderate	8.19***
High/Extreme	7.26***
Income after deductions	
<600 a week (ref)	--
600+ a week	1.80***
Don't know/refused/missing	0.84
Indigenous status	
Not indigenous	--
Indigenous	0.88

Figure 26. Survival function of time to stop breastfeeding (months), by LORI



Concluding remarks

The analysis of LSIC shows a general pattern of better health for defined health conditions of children living in remote areas. However, this relationship is not found when using a subjective measure of health. While the health conditions are used here as more objective measures of health they are also somewhat subjective as opportunities for diagnosis of many conditions may be more limited in rural and remote areas. The health of mothers showed a similar pattern with objective health conditions showing lower rates in areas of high isolation but a weak association is found with the subjecting measure of self reported health. For infants, measures of birth weight and breastfeeding both point to a healthy start to life for indigenous babies in the most isolated areas.

The findings of the relationship of income gradients to self-assessed health status using NATSISS resonate with the positive characterisation of outstation and homeland living embodied in the Utopia studies referred to above (Rowley, O'Dea et al. 2008). Those studies attributes the better health of Utopia residents to culturally appropriate community-controlled Aboriginal Medical Service and outstation living that generally includes a better diet and greater physical activity, plus living more harmoniously with culture, family and land. Also like this study Rowley et al (2008) looked at some of the usual suspects—social determinants of health such as unemployment, low income, overcrowding, lack of education. Both Rowley et al and our report conclude that outstations fared somewhat worse than the Indigenous average on these measures and hence by default the relative success in health outcomes was probably attributable to regional-specific factors such as 'outstation living'. Where this report departs from the Utopia studies is, when one generalises about outstations and homelands using representative statistical data, that the health premium is confined to the low income group. Another point of difference is that the evidence about claims about community harmony is probably not sustainable (at least in terms of perceived safety).

This report has identified that there are some health premium for living 'on country', especially in the low income group (in homelands)—but there are some countervailing influences arising from poor infrastructure, and ongoing social exclusion and local community that circumscribe putative health benefits. The implication for policy makers is that there are ongoing tradeoffs to take into account and that the short-run and long-run assessments may differ. In the short-run, one might get better health outcomes by providing services in homelands and hence giving people the choice for individuals to stay on country. However, unless economic opportunity and community dysfunction cannot be adequately addressed, then this is not a viable option in the long-run.

Policy should also take into account some key anthropological insights. Peterson (2010: 255) claims that the heart of the Indigenous 'commitment to kin is a deeply relational ontology, which is central to people's sense of self, making Indigenous people particularly dependent on being embedded

in a network of dense sociality'. The 'tolerance for a low standard of living combined with the receipt of payments that are citizen's entitlements effectively means that Aboriginal people are living in a private or ungovernable space that puts them beyond the easy reach of government policies aimed at changing their socioeconomic circumstances' (Peterson 2010: 256). 'The depth of what is required raises implementation issues of an order that few people other that the religious, or those at a distance tasked with finding solutions, feel they have the moral authority or the desire to take on' (Peterson 2010: 257).

To the extent that outstations do have a better health than communities with a more services and opportunities is an extraordinary achievement. It appears that the achievement is largely confined to those poor people who are less likely to have been able to access the services anyway. It is more remarkable that there is no significant difference in the health outcomes for the higher income quintiles. Does this indicate an indictment of the access to services in the hubs and town camps? The answer to this rhetorical question is probably yes. Whatever the answer to that question, our analysis in the bottom quintile indicates the likely existence trade-off between a greater connection to culture and possibly healthy (outdoor) lifestyle associated with some customary activities with other social determinants of health.

The focus on the culturally appropriateness of services in the various COAG agreements is warranted. Indeed, consultation about what services are wanted and how the services are provided are likely to be a precondition of their use. That is, citizen centred design of policy is desirable in itself and not just for the instrumental goals it achieves (Jordan, 2009). However, the reality of achieving this goal may be challenging than is generally recognised and it ultimately may not be possible to reconcile the clash cultural perspectives that may be evident in some of the social determinants of health (e.g. economic opportunity and community safety).

Some social scientists attempt to reconcile cultural factors with the more mainstream drivers of wellbeing and health (Dockery, 2009). For example, Rowse (2010: 176) gives an (conditional) endorsement for the use of rough proxies of cultural/social phenomenon that are intrinsically to measure in that they allow a challenge to the simple applications of social inclusion/exclusion theory. But this suggestion begs the question as to the adequacy of the underlying theory and whether it is feasible to provide credible evidence that equivocally supports a particular theory (Hunter 2004). Notwithstanding these rather academic debates, the practical difficulties of ensuring health services are usable and used in remote areas must be the first order priority.

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Appendix Tables

Table A1. NATSISS Respondents by income quintile and remoteness (number)

	REMOTE in homeland	**REMOTE not in homeland**	**Non-REMOTE**
quintile 1	579	1532	3776
quintile 2	174	529	1659
quintile 3	67	294	915
quintile 4-5	56	228	975

Table A2. LSIC Child's general health as rated by P1, by LORI (column percentages)

	LORI				
Health rating	None	Low	Moderate	High/ Extreme	**Total**
Excellent	50	43	48	43	**45**
Very good	30	32	31	28	**31**
Good	16	22	19	27	**20**
Fair or Poor	4	3	1	2	**3**
Total %	100	100	100	100	**100**
Total N	433	835	211	189	**1,668**

*Excludes 9 children with missing information

Pearson chi2(9) = 17.32 Pr = 0.044

Cramer's V =0.06

Table A3. Logistic regression of general health, and specific health conditions LSIC (ODDS ratios)

	Good, fair or poor general health (vs. excellent or very good)		Eczema		Skin infections		Asthma		Chest infection		Other	
Age of child												
0	1.18	1.22	0.94	0.89	0.90	0.83	0.52**	0.47**	0.86	0.83	0.83	0.8
1-2 (ref)	--	--	--	--	--	--	--	--	--	--	--	--
3-5	1.37**	1.30*	1.2	1.21	1.04	0.91	1.43**	1.41**	0.80	0.80	1.27	1.21
Sex of child												
Male (ref)	--	--	--	--	--	--	--	--	--	--	--	--
Female	0.86	0.85	0.91	0.89	0.89	0.84	0.52***	0.52***	0.76*	0.77*	1.02	0.92
Home needs repair												
Yes (ref)	--	--	--	--	--	--	--	--	--	--	--	--
No	1.08	1.05	1.23	1.27	0.71*	0.8	1.1	1.11	0.87	0.89	0.96	0.97
Income after deductions												
<600 a week (ref)	--	--	--	--	--	--	--	--	--	--	--	--
600+ a week	0.79*	0.79	1.72***	1.63***	1.05	1.03	0.83	0.85	1.44**	1.40**	1.24	1.13
Don't know/refused/missing	0.37***	0.44**	1.02	1.13	0.71	1.10	0.82	0.97	0.40**	0.30**	1.11	1.47
Whether anyone smokes in the house												
No (ref)	--	--	--	--	--	--	--	--	--	--	--	--
Yes	1.18	1.13	0.88	0.93	1.21	1.18	0.73	0.88	0.83	0.75	0.77	0.77
Level of relative Isolation												
None (ref)	--	--	--	--	--	--	--	--	--	--	--	--
Low	1.26	1.35*	1.24	1.29	1.25	1.24	0.75	0.74	0.61***	0.60***	0.59**	0.58**
Moderate	1.01	1.12	0.17***	0.15***	2.84***	3.26***	0.33***	0.34***	0.35***	0.38***	0.40**	0.29***
High/Extreme	1.50*	1.92***	0.21***	0.25***	1.48	1.67	0.32***	0.41**	0.24***	0.27***	0.23***	0.25***

Table A3 (continued). Logistic regression of general health, and specific health conditions (ODDS ratios)

	Good, fair or poor general health (vs. excellent or very good)		Eczema		Skin infections		Asthma		Chest infection		Other	
Prenatal and post natal												
Mother smoked during												
No (ref)		--		--		--		--		--		--
Yes		0.96		1.1		0.78		0.94		0.99		1.00
Mother drank during												
No (ref)		--		--		--		--		--		--
Yes		0.97		1.15		1.71**		0.77		1.52**		1.02
Whether child was breastfed												
No (ref)		--		--		--		--		--		--
Yes		0.79		0.82		0.99		0.67**		0.96		1.81**
Overall model significance	<0.001	<0.001	<0.001	<0.001	0.014	0.007	<0.001	<0.001	<0.001	<0.001	0.005	0.014
Number of observations	1,627	1,447	1,627	1,447	1,627	1,447	1,627	1,447	1,627	1,447	1,627	1,447

Table A4. LSIC Mother's general health, by LORI (column percentages)

	LORI				
Health	None	Low	Moderate	High/Extreme	Total
Excellent	21	13	27	24	18
Very good	30	29	37	23	29
Good	37	47	31	45	42
Fair	12	12	5	9	11
Total	100	100	100	100	100
Total N	409	763	196	164	1,532

*Excluding 14 cases with missing information

Pearson chi2(9) = 49.57 Pr = 0.000

Cramer's V = 0.104