

Drivers of disadvantage and prosperity – is car ownership a good indicator?

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1 Introduction

Improved understanding of the multidimensional nature of disadvantage is leading to development of a wider range of measurement variables than traditional income poverty lines (Saunders *et al.*, 2007, Gordon *et al.*, 2000). One of the variables now commonly included in indices of disadvantage, is households that do not have a car (Tanton *et al.*, 2006; ABS, 2003; Townsend *et al.*, 1988).

This paper questions the logic of including not having a car as an indicator of disadvantage. It argues that the inclusion of this variable distorts the true picture of the distribution of advantage and disadvantage in wealthy nations such as the UK and Australia.

The purpose of this paper is not to undermine the development of multidimensional measures of disadvantage, but rather to open debate and contribute to the development of more accurate measures of disadvantage. An examination of such measures of disadvantage can also help to illuminate the role of transport in addressing disadvantage and delivering economic prosperity.

This paper is structured as follows:

- Section 2 describes three major indicators of disadvantage which incorporate zero car ownership as a component indicator. In each case the application of the indicators is outlined and the potential implications of car ownership discussed.
- Section 3 presents the case for inclusion of household zero car ownership as an indicator of disadvantage.
- Section 4 presents the arguments against the use of zero car ownership.
- Section 5 is a discussion of the arguments presented for and against using zero car ownership as an indicator of disadvantage in particular in the context of climate change amelioration policy and the potential impact of carbon emissions trading; and
- Section 6 summarises the key findings of the study and presents suggestions for further research in this field.

2 Multidimensional measures of disadvantage

There is increasing interest in multidimensional measures of disadvantage due to the recognition that income poverty alone is not an adequate measure. A person's living standards and life chances will be influenced by a range of factors in addition to income, such as social participation and the ability to access public services (see for example Saunders *et al.*, 2007, Gordon *et al.*, 2000). Authors in the field of social exclusion for example argue that in addition to income poverty, disadvantage is a result of a person's non-participation in the key activities of their society (deHaan and Maxwell, 1998; Burchardt *et al.*, 2002) which may be understood to be differentiated from income poverty, due to evidence of inequality existing within groups who have income equality (Barry, 2002).

A number of multidimensional measures of disadvantage (including those described below) include car ownership, or having a car, as a measurement variable. Three multidimensional measures of disadvantage are considered:

- the Townsend Index (Townsend *et al.*, 1988)
- the Index of Relative Socio-Economic Disadvantage (ABS, 2008) and
- the Child Social Exclusion Index (Tanton *et al.*, 2006).

This section describes these indicators and the potential implications of including car ownership as a component variable.

2.1 Townsend Index of Material Deprivation

The Townsend Index of Material Deprivation was originally developed using variables from the 1981 census in the UK. The index provides a framework for understanding material, as opposed to social deprivation. The four indicators are 'unemployment', 'car ownership', 'home ownership' and 'overcrowding' (Townsend *et al.*, 1988, p. 36). The car ownership variable 'percentage of private households who do not possess a car' is included based on the assertion that 'a number of studies show that it is probably the best surrogate for current income' (p. 37).

The index has been used in a range of applications in research, in particular in health studies and consequently informs service development, delivery and resource distribution. Some recent examples of specific uses include a study exploring the influence of deprivation on patients entering a psychotherapy service (Saxon *et al.*, 2007) and another aiming to assess physical activity in cohorts of adolescents (Brodersen *et al.*, 2007). The growing influence of these multidimensional measures of disadvantage in research and policy is likely to strengthen with the development of the social inclusion agenda in Europe and Australia. However it is important that they are only adopted with a full understanding of the complexity of the composition and spatial distribution of disadvantage and the variables that can properly measure it.

2.2 Index of Relative Socio-Economic Disadvantage (IRSED)

IRSED is one of four indexes developed by the Australian Bureau of Statistics (ABS), known as the Socio-Economic Indexes for Areas, or SEIFA. These indices, published since 1971, are derived from census data at the collector district (CD) level in order to measure socio-economic differences across the Australian population, by geographic area (ABS, 2003, p.1).

The SEIFA indexes include three levels of variables. The first level includes education, income and occupation, which the ABS asserts represent the core variables associated with socio-economic status (ABS, 2003, p. 1). The second level variables relate to wealth, living conditions and access to services. The third level includes variables that the ABS associates

with disadvantage, but that may not cause it, for example a high proportion of Indigenous people living in an area (ABS, 2003, p. 2). Highly correlated variables (correlation coefficient > 0.8) measuring the same aspect of advantage/disadvantage are removed (ABS, 2004 p.23).

The IRSED is made up of 17 variables relating to disadvantage (ABS, 2008), drawn from across the three levels of variables described above (ABS, 2004, p. 39). The variable of interest to this article is 'NOCAR' that represents the '% occupied private dwellings with no car' (ABS, 2008, p. 41).

As with the Townsend Index, important decisions such as resource distribution are based on IRSED. For example, the Victorian Department of Human Services (DHS), that 'plan, fund and deliver health, community and housing services' (Department of Human Services, 2007) promotes the use of IRSED to its staff to '...quickly and easily identify geographic areas that are relatively disadvantaged' (Department of Human Services, 2003, p. 1).

IRSED was endorsed by Australian education ministers as 'the most suitable basis for collecting data nationally, and school systems agreed to use it when submitting SES related data for national reports' (MCEETYA, 1998, p. 40).

2.3 Index of child social exclusion (CSE Index)

The National Centre for Social and Economic Modelling (NATSEM) used data from the ABS 2001 Census of Population and Housing in the development of an area index of children at risk of social exclusion (Tanton *et al.*, 2006, p. 4).

The 35 indicators used include income, measured in conjunction with variables representing family type, education and employment variables, language other than English spoken at home, use of computer at home and 'proportion of children aged 5 – 15 in household with no motor vehicle' (p. 5).

The index has been used to demonstrate the proportion of children aged 0 - 15 at risk of social exclusion within Statistical Local Areas. The results are ranked and represented in deciles.

As demonstrated, there is widespread use of zero car ownership as an indicator of disadvantage in multidimensional indexes. These indexes are used to identify locations of disadvantage based on demographic data and do not account for material differences in provision and accessibility of services which in turn influence social inclusion.

3 Arguments for 'no car' variables

There appear to be two key reasons supporting the inclusion of 'not having a car' as a valid measure of disadvantage. These are:

- the correlation between car ownership and income
- the impact which not having a car has on participation.

3.1 The correlation between car ownership and income

Traditionally, households with higher incomes have been shown to be more likely to have one or several cars compared to those on lower incomes (Clifton and Lucas, 2004, Hine and Mitchell, 2003; Giuliano and Dargay, 2006; Pucher and Renne, 2003).

In metropolitan Melbourne, analysis of 2001 Census data by Currie and Senbergs (2007) identified that 7.3 percent of lower income households (incomes below \$500 per week) did not own a motor vehicle, compared to only 2.9 percent of households with incomes above this (p.5). Conversely only 4.8 percent of the low income households owned two or more cars, compared to 47.2 percent of the higher income households (p.5). These figures demonstrate a strong present link between income and car ownership, which could support the validity of including possession of a car as an indicator of advantage, at least insofar as it is an indicator of assets or material possessions.

3.2 The impact of not having a car on participation

Participation impacts of transport disadvantage have been widely documented and in the case of non car ownership, a number of specific issues have been identified.

The UK Social Exclusion Unit (SEU, 2003) found that people without cars paid higher grocery prices at walk accessible local shops. It was also found that almost one-third (31%) of people without a car reported difficulties accessing their local hospital compared to 17 per cent of people with a car. Rugg and Jones (1999) found that young people working in rural England needed their own transport to maintain employment (p. 22).

Qualitative research conducted with low-income, non car owning mothers in the UK describes:

- stress from walking with young children
- difficulty in maintaining social networks
- mothers not accessing health and community services
- families not having recreational day trips (Bostock, 2001).

Australian examples include the inability to access after school activities and sports for children (Hurni, 2007, p. 10.9) and the perception by young people that owning a car was the most significant factor in their decisions regarding undertaking post-secondary education (LGCTWG, 2007, p. 17).

Importantly, within groups of socially disadvantaged people, those without cars tended to travel less (Stanley and Stanley, 2007), thus possibly reducing their well being and opportunities for inclusion.

Car ownership, once regarded as an indicator of personal prosperity, has become increasingly problematic as an indicator of relative advantage or disadvantage in the absence of other measures of spatial accessibility or locational disadvantage.

4 Arguments against 'no car' variables

There is an implicit assumption inherent in much recent research that cars are essential to participation. With cars being described as 'a virtual necessity' (Pucher and Renne, 2003, p. 55) and the lack of a car as 'one of the key defining factors in people's disadvantage' (Clifton and Lucas, 2004, p. 22). Hine (2007) also suggested that public transport has a role to play in 'ameliorating aspects of social exclusion for non-car owning households' (2007 p.04.1). This can be said to infer that the car is the key to participation and inclusion in today's society.

The following evidence argues against including 'no car' variables as a measure of disadvantage.

4.1 Evidence from the UK

Comparisons between the UK and Australia need to be treated with caution, due to higher population densities and lower overall rates of car ownership in the UK. In 2002 in the UK, there were 44 private vehicles per 100 inhabitants compared to 52 per 100 in Australia (OECD, 2005, p. 121). Nonetheless the following exploration of the relationship between car ownership and disadvantage supports the argument that the relationship may not be as strong as previously believed. In 2003, Christie and Fone explored the validity of the car ownership census variable in the Townsend Index (see earlier) for rural districts of Wales. They aimed to assess:

1. whether 'the relation between lack of car ownership and socio-economic deprivation varies between urban and rural enumeration districts in Wales, UK'
2. if '...excluding car ownership from the Townsend Index substantially affects the deprivation ranking of enumeration districts' (p.113).

Christie and Fone calculated the Townsend score for each enumeration district¹ and then recalculated it without the car ownership variable. They found that the proportion of households without a car was lower in rural districts and that the correlation coefficients between car ownership and the other seven variables was higher in urban than rural areas. This suggests that the link between owning a car and experiencing multiple disadvantage is less correlated in rural areas, than in urban areas. Their results by excluding car ownership variables reclassified urban areas as less deprived and rural areas as more deprived than represented by the standard Townsend Index (p.115).

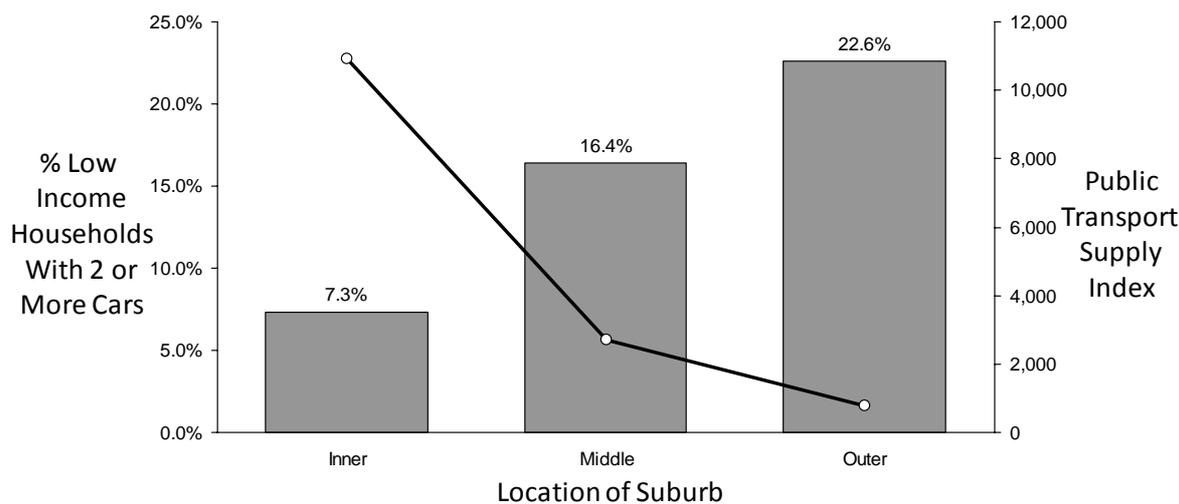
These findings are corroborated by earlier work from Focas (1998) who found that in parts of Central London with good public transport and restricted car parking, car ownership is relatively low but these locations are comparatively wealthy. So the correlation between income and car ownership is not as clear where there is good public transport and parking limitations. Although this evidence supports the case for removing zero car ownership from indicators of disadvantage, the context of Central London can hardly be said to be typical of Australian communities.

4.2 Evidence from Melbourne, Australia

An analysis of income, car ownership and travel in metropolitan Melbourne also found evidence that car ownership and income are not well correlated although in rather different ways to the evidence from Central London.

Currie and Senbergs (2007) found that the share of low income households (income below \$Aust 500/week) with high car ownership (2 or more cars per household) increased considerably in areas where public transport supply is low (Figure 1).

¹ Census data collection area



Source: Based on Currie and Senbergs (2007)

Note: PT Supply Index score is based on number of services per week factored by the spatial coverage of the areas by public transport. Higher values imply greater supply and coverage of areas by Public Transport

Figure 1 – Share of low income households with two or more cars

Low income households with high car ownership, combined with a lack of alternatives such as good walk accessibility or public transport, have been used to suggest that some households may be 'forced' into car ownership and use (Banister, 1994). Currie and Senbergs (2007) found 20 831 outer Melbourne households with low income and high car ownership. These households had zero or very low walk access to local activities and limited public transport (p.22). According to Australian National Roads and Motorists' Association (NRMA, figures cited by Currie and Senbergs), the cost of operating even the smallest cars would represent as much as 50 per cent or more of total income for these households. Hence these households display an inverse relationship between income and car ownership. Where ownership is high it represents a considerable financial burden regardless of the impacts which it may have on travel and participation.

Another insight from the Currie and Senbergs research was the contrasting behaviour of low income households without a car in fringe urban areas. Travel in low income households with high car ownership was highly car dependent (80% of travel) whilst low income households without a car primarily walked (58% of travel) or used public transport (17% of travel). This is because households without a car lived near to activity centres where walking is feasible and where public transport service tended to be concentrated (e.g. around stations). This contrasts with low income families with high car ownership who lived in areas inaccessible to public transport.

These findings suggest a much more complex relationship between disadvantage, car ownership and income. In this case low income households without a car might be seen to be considerably better off than those with a car because they:

- do not have to spend a high share (over 50%) of income on running a car
- can walk to activities
- can access public transport.

Clearly in this context zero car ownership as a variable describing disadvantage is a very blunt and potentially misleading tool.

Another finding from the Currie and Senbergs review put the scale of this debate into context. While 20,831 low income fringe urban households were identified with high car ownership there were only 16,357 without a car. Hence high car ownership considerably

outweighs zero car ownership in outer urban areas. If one accepts that high car ownership on low income is a very important indicator of disadvantage it is possible to conclude that having a car in outer Melbourne has a positive relationship to disadvantage not a negative one as is implied by the measures of disadvantage described in section 2.

5 Discussion

These results suggest that in order to be able to adequately identify and respond to disadvantage in Australia, the relationship between socio-economic disadvantage and locational disadvantage needs to be better understood.

The use of 'not having a car' as a variable in measures of disadvantage may be problematic because, areas of low car ownership are defined as disadvantaged when, as demonstrated, this may not be the case. Inner urban residents may be in a position to choose to not have a car because of high levels of public transport and services accessibility. Evidence of high public transport patronage, walking and cycling to work in inner Melbourne suburbs (DOI, 2007, p. 11) support this proposition.

The costs and trade-offs associated with car ownership in low income households are clearly not adequately represented when a 'no car' variable is used. A key question emerges: what social, health or educational opportunities are being foregone in households where up to 50 percent of household income is being used to maintain private auto mobility?

5.1 The compounding influence of climate change

Research describing carbon use by low income Victorian households (Unkles and Stanley, 2008) corroborates the findings of Currie and Senbergs. Households whose principal source of income is government pensions and/or benefits represent 12.4 per cent of the Victorian population and account for many, but not all low income households in the State (p.1). The spatial distribution of carbon use in these households reflects to a high degree, the spatial distribution of high car ownership in low income households on the outer fringe of Melbourne as identified in the work of Currie and Senbergs. This is suggestive of a combined problem; high costs of car ownership and high carbon emission footprints for low income households.

Unkles and Stanley identify that with the exception of one Local Government Area (LGA), the poor households in high carbon use areas, have relatively lower spending on public transport and relatively higher spending on private cars, than their counterparts in lower carbon use LGAs. Both sets of authors propose that the reasons for this distribution pattern of car ownership are poor public transport accessibility and limited local provision of goods and services; both leading to increased necessity for car travel for people in outer Melbourne areas.

It is likely that the veracity of car ownership as a measure of disadvantage will be further diminished as the impacts of climate change and climate change amelioration policy affect the Victorian community. In addition to fuel price increases, the introduction of an emissions trading scheme in 2010 (Department of Climate Change, 2008) will introduce a carbon price on about 70 percent of goods and services (Wong, 2008) and is likely to include the costs of owning and running cars.

Calculations by the National Institute of Economic and Industry Research (2007) estimate that a utility adjusted (weighted to reflect the relative prosperity of the people receiving the benefit or bearing the cost) overall carbon price of \$25 per tonne would account for a 2.5 per cent increase in household expenditure for poor households and a 0.4 per cent increase for high income tertiary educated households (p.17). Given the spatial distribution of

carbon use in the poor households described above, it can be anticipated that the impact of a carbon price will impact more heavily in areas identified as having poor public transport and poor walk accessibility. The regressive nature of this pricing will have significant equity impacts (Unkles and Stanley, 2008, p. 5).

There are two possible outcomes of this increased carbon cost. Poor people will relinquish their cars, which in the absence of good public transport will severely limit their participation and their access to goods and services. The alternative is that they will bear the significantly increased costs of car travel, which will further constrain non-transport spending and entrench economic disadvantage.

It is also likely that households (both poor and higher income) will choose to relinquish their car as a way of reducing their carbon footprint. This will further diminish the representativeness of the car as an indicator of advantage.

6 Conclusion

This paper has questioned the logic of including not having a car as an indicator of disadvantage. It has argued that the inclusion of this variable distorts the real picture of the distribution of advantage and disadvantage in wealthy nations such as the UK and Australia.

The paper has reviewed three major indices of disadvantage from the UK and Australia. Each is influential in defining social policy and each includes not having a car as a major component variable.

The paper has described the rationale for including car ownership as an indicator of disadvantage. Car ownership is commonly related to income and hence lack of a car is associated with low income and disadvantage. In addition car ownership is related to travel and hence participation levels. By implication lack of a car is commonly associated with lack of participation.

Evidence from the UK (Christie and Fone, 2003) has shown that including car ownership as an explanatory variable can act to distort the pattern of disadvantage. An inverse correlation between low car ownership and income was found in Central London where public transport quality and walk accessibility were high (Focas, 1998; Church *et al*, 2000). In fringe urban Australia, Currie and Senbergs (2007) found a high share of low income families demonstrated high car ownership. This situation might be said to be 'forced' on low income households where car ownership represents over half of all expenditure. Conversely low income households in fringe urban areas who had no costs associated with car ownership lived in areas where walking and public transport were accessible. In these cases, lack of a household car might be seen as a measure of advantage whilst having a car could be quite the reverse. Clearly car ownership has a more complex link to disadvantage than implied by conventional indicators of disadvantage.

Indices of disadvantage are currently used to define research samples and influence policy and the distribution of resources. If they misrepresent the true distribution of disadvantage, there is a risk that inequity can become reinforced. When areas of high car ownership are excluded from research exploring issues faced by disadvantaged communities, or are not targeted for provision of social and community services, accessibility problems are likely to become more entrenched. There is a real danger that measures of disadvantage act to perpetuate problems not solve them.

Development of multi-dimensional indexes will be improved if car ownership variables are taken into consideration in relation to public transport supply and the accessibility of goods

and services. A more comprehensive understanding of this complex picture of disadvantage will help generate more accurate indices of disadvantage. To this end a number of areas for further research in this field are warranted:

- It is unclear from existing research how the participation and mobility provided by car ownership trades off against the high costs for low income families. Research should better clarify the expenditure trade-offs being made for low income families in outer urban areas.
- Conversely it is unclear if walk accessibility and public transport act to meet the mobility and participation needs of low income families without a car in fringe urban areas.
- A major trade off being made by both groups involves housing costs and the quality of the housing stock. It is likely that low income families living near to activities will face a higher cost and a smaller housing stock compared to those living further away with cheaper and larger stock housing. Research needs to explore these trade offs and the extent to which home location decision processes are made in a manner which is informed by the trade-offs between cost, accessibility and mobility.
- A major benefit of the current multi variable measures of disadvantage is that they can be relatively simple and cost effective to assemble. A more informed use of car ownership variables within these measures needs to avoid a complex methodology or it will risk omission from indices of disadvantage. This would be unfortunate since there is much evidence from Australian and international research that transport is an important aspect of wider disadvantage. A more accurate and effective means of better representing transport and car ownership factors in measures of disadvantage is required.

References

- ABS (2003). *Census of Population and Housing Socio-Economic Indexes for Areas: Australia 2001*. Information Paper. Cat. No. 2039.0, Australian Bureau of Statistics: Canberra.
- ABS (2004). *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA)*. Technical Paper. Cat. No. 2039.0.55.001, Australian Bureau of Statistics: Canberra.
- ABS (2008). *An introduction to Socio-Economic Indexes for Areas (SEIFA) Australia 2006*. Information Paper. Cat. No. 2039.0, Australian Bureau of Statistics: Canberra.
- Department of Climate Change (2008). *About the ETS*. Department of Climate Change, Australian Government: Canberra.
- Banister, D. (1994). *Internalising the social costs of transport*. OECD/ECMT Seminar. Paris.
- Barry, B. (2002). 'Social exclusion, social isolation, and the distribution of income'. In Hills, J., Grand, J. L. and Piachaud, D. (Eds.) *Understanding Social Exclusion*. Oxford University Press, Oxford, UK.
- Bostock, L. (2001). 'Pathways of disadvantage? Walking as a mode of transport among low-income mothers'. *Health and Social Care in the Community*, 9, pp. 11–18.

- Brodersen, N., Steptoe, A., Boniface, D. and Wardle, J. (2007). Trends in physical activity and sedentary behaviour in adolescence: ethnic and socioeconomic differences. *British Journal of Sports Medicine*, 41.
- Burchardt, T., Grand, J. L. and Piachaud, D. (2002). 'Introduction'. In Hills, J., Grand, J. L. and Piachaud, D. (Eds.) *Understanding Social Exclusion*. Oxford University Press, UK.
- Christie, S. and Fone, D. (2003). 'Does car ownership reflect socio-economic disadvantage in rural areas? A cross-sectional geographical study in Wales, UK'. *Public Health*, 117, pp. 112-116.
- Clifton, K. and Lucas, K. (2004). 'Examining the empirical evidence of transport inequality in the US and UK'. In Lucas, K. (Ed.) *Running on empty: transport, social exclusion and environmental justice*. Policy Press: Bristol, UK.
- Currie, G. and Senbergs, Z. (2007). *Exploring forced car ownership in metropolitan Melbourne*. 30th Australasian Transport Research Forum: Melbourne.
- De Haan, A. and Maxwell, S. (1998). Poverty and social exclusion in north and south. *IDS Bulletin*, 29, pp. 1-9.
- Department of Human Services (2003). *Measuring disadvantage across Victoria*. Victorian Government: Melbourne.
- Department of Human Services (2007). *About the Department of Human Services*. Victorian Government: Melbourne.
- DOI (2007). *A snapshot of journey to work patterns*. Policy and Intergovernmental Relations Division, Department of Infrastructure: Melbourne.
- Focas, C. (1998) *The four world cities transport study*. The Stationery Office: London, UK.
- Giuliano, G. and Dargay, J. (2006). 'Car ownership, travel and land use: a comparison of the US and Great Britain'. *Transportation Research A*, 40, pp. 106-124.
- Gordon, D., Levitas, R., Pantazis, C., Patsios, D., Payne, S., Townsend, P., Adelman, L., Ashworth, K., Middleton, S., Bradshaw, J. and Williams, J. (2000). *Poverty and social exclusion in Britain*. Joseph Rowntree Foundation: York, UK.
- Hine, J. (2007). 'Transport disadvantage and social exclusion in the UK'. In Currie, G., Stanley, J. and Stanley, J. (Eds.) *No Way to Go: Transport and Social Disadvantage in Australian Communities*. Monash University ePress: Melbourne.
- Hine, J. and Mitchell, F. (2003). 'Transport disadvantage and social exclusion: Exclusionary mechanisms in transport in urban Scotland', Ashgate: Aldergate, UK.
- Hurni, A. (2007). 'Marginalised groups in western Sydney: The experience of sole parents and unemployed young people'. In Currie, G., Stanley, J. and Stanley, J. (Eds.) *No Way to Go: Transport and Social Disadvantage in Australian Communities*. Monash University ePress: Melbourne.
- LGCTWG (2007). *The challenge of getting around: Rural, remote and isolated: Rural youth transport survey 2005–2006*. Let's Get Connected Transport Working Group, Wellington and East Gippsland. Wellington Shire Council: Sale, Victoria.

- MCEETYA (1998). *National report on schooling in Australia: 1998*. Ministerial Council on Education Employment, Training and Youth Affairs: Melbourne.
- OECD (2005). *Environment at a glance: OECD environmental indicators*. Organisation for Economic Co-operation and Development: Paris.
- Pucher, J. and Renne, J. L. (2003). 'Socioeconomics of urban travel: Evidence from the 2001 NHTS'. *Transportation Quarterly*, 57, pp. 49-77.
- Rugg, J. and Jones, A. (1999). *Getting a job, finding a home: Rural youth transitions*. Policy Press: Bristol, UK.
- Saunders, P., Naidoo, Y. and Griffiths, M. (2007). *Towards new indicators of disadvantage: Deprivation and social exclusion in Australia*. Social Policy Research Centre: Sydney.
- Saxon, D., Fitzgerald, G., Houghton, S., Lemme, F., Saul, C., Warden, S. and Ricketts, T. (2007). 'Psychotherapy provision, socioeconomic deprivation, and the inverse care law'. *Psychotherapy Research*, 17.
- Social Exclusion Unit (2003). *Making the Connections: Final Report on Transport and Social Exclusion*. Social Exclusion Unit: London.
- Stanley, J. and Stanley, J. (2007). 'Public transport and social policy goals'. *Road and Transport Research*, 16, pp. 20.
- Tanton, R., Harding, A., Daly, A., McNamara, J. and Yap, M. (2006). *Children at risk of social exclusion: methodology and overview*. International Geographic Union Conf.: Brisbane.
- Townsend, P., Phillimore, P. and Beattie, A. (1988). *Health and deprivation: Inequality and the North*, Croom Helm: Beckenham, UK.
- Unkles, B. and Stanley, J. (2008). *Carbon use in poor Victorian households by local government area*. Brotherhood of St Laurence: Fitzroy, Victoria.
- Wong, P. (2008). *Climate change: an opportunity for innovation and growth* Address by The Hon P. Wong to the Australian Industry Group. 6th February, 2008
<<http://www.environment.gov.au/minister/wong/2008/pubs/op20080208.pdf>>.