Correspondence. Dr Arlo Upton, Microbiology Laboratory, Middlemore Hospital, Private Bag 93311, Otahuhu, Auckland. email: aupton@middlemore.co.nz

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VIEWPOINTS

Socio-economic position is more than just NZDep

Tony Blakely, ***Senior Research Fellow, Department of Public Health, Wellington School of Medicine and Health Sciences, University of Otago;*** **Neil Pearce,** ***Professor, Centre for Public Health, Massey University (Wellington).***

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The development of small area measures of socio-economic deprivation using 1991 (NZDep91) and 1996 (NZDep96) census data has been a huge advance for research and policy in New Zealand. The components of the NZDep index include the proportions at a small area-level (involving approximately 100 individuals) of census variables such as individuals with/in: no telephone access; no car access; receipt of a means-tested benefit; unemployment; low-household income; single-parent families; nil qualifications; non-tenured homes; and household crowding.[1,2] NZDep is now routinely used as a variable by which to report health status,[3,4] in population-based funding formulae, and in research.[5-11] It has several advantages. First, it can be assigned retrospectively and inexpensively to many data-sets using just an address. Second, unlike variables such as occupational class for which the relevant information is often not available in routine health records, the vast majority of routine health records have an address. Third, the variable is a robust measure of socio-economic position based on the average values of census variables. (The term 'socio-economic position' is an umbrella term for a range of socio-economic factors including income, education, material and social deprivation, absolute and relative poverty, occupational class, asset wealth, and so on).[12,13] Consequently, the ranking of individuals by the NZDep score/decile assigned to their neighbourhood is, on average, strongly and linearly related to health and other social outcomes.

As with any good tool, the widespread use of NZDep also makes it prone to widespread misuse. Our aim in this paper is to address these potential misuses and, hopefully, prevent or reduce their occurrence. Our views, although explored in more depth, are consistent with those expressed elsewhere by the originators of NZDep.[2]

Broadly speaking, there are four potential uses of NZDep:

- funding formulae and resource allocation
- community-based advocacy
- targeting of policy/interventions
- research and analysis.

Perhaps the main reason for developing NZDep was for resource allocation.[14] For example, NZDep can be used as a component in funding formulae for primary health care. As long as its use in funding is for large aggregates of people then NZDep is robust – misclassification of rich people who live in deprived areas and poor people who live in non-deprived should all balance out on average at the aggregate-level. However, NZDep is prone to misuse when used to target interventions and for research and analysis. We consider these two situations in the next two sections.

Limitations for targeting

There is no threshold above which socio-economic position causes poor health, rather poor health is distributed as a *gradient* by socio-economic position.[4,15,16] Thus, targeting policies at high(er) risk groups not only has a surprisingly small return even if the interventions are effective, but by focusing on the high risk groups misses the point that the occurrence of high risk groups is a function of how the whole population is structured. As eloquently articulated by Rose,[17,18] this paradox points to the need for population-based strategies rather than just targeting. In terms of the maldistribution of health by 'deprivation', therefore, we not only require policies targeted at deprived people/places, but also policies that prevent deprivation in the first place.

Given that some targeting is required as one component of a multi-pronged strategy, NZDep is an obvious candidate to use. However, just because a factor (such as NZDep) is the easiest to measure, does not mean that it is the most important socio-economic factor in aetiologic terms (see below) or the most appropriate basis for targeting interventions.[12,13] For example, one might argue that targeting of subsidies for GP visits should be done on the basis of income.

Not all 'deprived people' live in deprived small areas.[12,13] Shown in Table 1 are the number of 25-64 year olds in the 1991 census (n= 1.65 million) who were Maori, Pacific, unemployed, living in a household with an equivalised household income less than $20 000, nil educational qualifications, belonging to occupational class 6 (i.e. lowest class) and living in a household with no car access. In addition, Table 1 shows the percentage of these people living in each quintile of small areas by NZDep91, where quintile 1 comprises the least deprived areas and quintile 5 the most deprived areas. Of note, only 25% to 30% of the poor, those with no formal educational qualifications and belonging to occupational class 6 also live in the most deprived quintiles of small areas (as measured by NZDep). Figure 1 makes the same point, but for children by household income by NZDep91. Whilst income-based and area-based measures of socio-economic status are highly correlated, children living in low-income households also reside in non-deprived small areas and vice-versa. Salmond and Crampton have also reported only a weak correlation between the individual-level measure of deprivation and NZDep.[2] Generalising, and conversely, the (vast) majority of 'deprived' individuals according to the three classic measures of socio-economic position (income, education and occupational class) would miss out on any interventions targeted to the most deprived

quintiles of small areas by deprivation. Thus, if targeting of interventions by individual socio-economic position is needed, more than just targeting by socio-economic deprivation of the neighbourhood is required.

Table 1. Percentage distribution of 1991 census respondents age 25-64 years by demographic or socio-economic factors by NZDep91 quintiles (1 = least deprived; 5 = most deprived).

Variable	Census count	Percentage distribution by NZDep91 quintile 1	2	3	4	5
Ethnicity						
Maori	165 300	6%	10%	15%	24%	45%
Pacific	62 589	4%	7%	12%	23%	54%
Non-Maori non-Pacific	1 411 941	25%	23%	21%	18%	13%
Socio-economic factors						
Unemployed	89 823	11%	15%	18%	24%	33%
Income < $20,000	326 523	11%	16%	20%	23%	30%
Nil Education	557 028	14%	18%	20%	22%	26%
NZSEI Occupational class 6	110 643	13%	18%	20%	24%	25%
Nil car access	96 375	5%	9%	14%	24%	48%

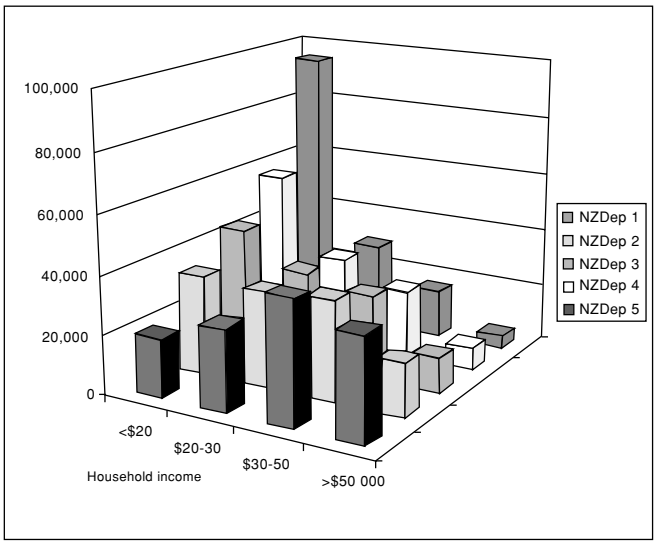

Figure 1. Number of 0-14 year old children at 1991 census by cross-classification of equivalised household income and quintile of small area socio-economic deprivation.

We are also concerned about debates among policy-makers regarding whether, having included NZDep in funding formula, it is necessary to further include ethnicity. The answer is clearly yes: any area-based interventions will only reach a minority of Maori; residual differences in health status by ethnic group remain after incorporating just one socio-economic factor[10,19] (see below); ethnicity is not included in NZDep; and addressing Maori health issues also requires consideration of cultural issues of access to health care (eg cultural safety) in addition to the more general socio-economic issues that we are considering here.

Limitations for research/analysis

NZDep is an area-based measure. Compared to other small area deprivation indices internationally it is calculated at a low-level of aggregation of approximately 100 people. Use of these particularly small areas to calculate deprivation NZDep is, in large part at least, capturing personal socio-economic position.[2,20] It also probably captures some contextual effects on health of the neighbourhood's socio-economic profile, but it is difficult to tease apart the contextual from the individual-level effects on health. For example, we have found that about half of the association of NZDep with mortality in the New Zealand Census-Mortality Study is 'explained' by controlling for personal socio-economic factors (work in progress). But the interpretation of this finding is problematic. Due to inevitable measurement error (and the failure to measure socio-economic factors across the life-course) much of this observed residual association of small area deprivation with mortality probably still reflects the effects of personal socio-economic position.

The fundamental misuse of NZDep in research and analysis is the implicit assumption that small area deprivation and socio-economic position are synonymous. For example, we have seen many analyses of 'health inequalities by deprivation' conceptualised as fully capturing 'health inequalities by socio-economic position'. This assumption is incorrect. Indeed, to assume that any *single* measure of socio-economic position is synonymous with socio-economic position is incorrect. Small area deprivation (or any other single socio-economic factors) is only one measure of the broader construct of socio-economic position. Our point may seem overly pedantic, but if not understood has serious implications when extended to analyses that attempt to answer the question "How much of the association of X with health status is 'due' to socio-economic position?" For example, consider the issue of how much of the association of ethnicity with mortality is attributable to socio-economic position.[10,18,19] Demonstrating that *only* a third of the gap between Maori and non-Maori mortality rates is due to NZDep (or any other separate measure of socio-economic position) *does not mean* that only a third of the gap is due to socio-economic position.[10] Without doubt, controlling for a range of socio-economic factors and at a number of points during the life-course would see much more of the Maori non-Maori gap 'explained'. (What it actually means to control for socio-economic position when considering ethnic differences in health is a complex issue beyond the scope of this paper).[21,22] This problem also applies to other research questions. For example, finding a statistically significant association of (lack of) fruit and vegetable consumption with ischaemic heart disease having controlled for small area deprivation (or any other separate measure of socio-economic position) at the time of diagnosis does not mean that there is still not further residual confounding by socio-economic position.[23,24]

Conclusion

NZDep is a powerful tool, and is easier to use in practice than most other measures of socio-economic position. However, there are also problems with using it alone as a measure of socio-economic position. In particular:

- the use of some threshold of NZDep (or any other measure of socio-economic position) for 'targeting' interventions at a high-risk populations may divert attention from population-based strategies; health inequalities span right across society as a gradient and are not just confined to the 'deprived'
- however, if high risk groups or individuals are to be 'targeted' then it is unlikely that an area-based strategy alone is most appropriate as:
  - not all deprived people live in deprived areas
  - area-level socio-economic effects on health are important, but probably not as important as personal socio-economic effects
- other measures of socio-economic position, and ethnicity, are required in addition to just NZDep for any targeting of interventions

It should be stressed that the issues described here are not merely academic. Taking a targeted and area-based approach to health policy and public health interventions has major implications for the future health of New Zealanders, and the future role of the public health services. If such an approach is to be followed, it should be evidence-based, and carefully justified and planned, and should only occur after considerable debate. The danger is that such an approach may occur by default, rather than by design. In particular, it would be easy for future policy in New Zealand to be targeted by NZDep alone just because it is easy to measure. If targeting of public health interventions by socio-economic position is required, a careful case-by-case consideration is required of which and how many measures of socio-economic position to use rather than just defaulting to NZDep.

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Correspondence. Tony Blakely, Department of Public Health, Wellington School of Medicine, PO Box 7343, Wellington South. Fax: (04) 389 5319; email: publichealth@wnmeds.ac.nz

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How much excercise is enough? Are we sending the right message?

James C Baldi, ***Lecturer;*** **Stewart M Robinson,** ***Senior Lecturer, Department of Sport and Excersice Science and Faculty of Medicine and Health Sciences, University of Auckland, Auckland.***

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For decades, health professionals have encouraged people to become more active, thereby reducing the likelihood of developing coronary heart disease (CHD), hypertension, diabetes and other conditions linked to sedentary living. Through the 1970s and 80s, consensus recommendations stated that vigorous activity lasting 20 – 60 minutes should be performed 3 – 5 times per week[1] for health benefit. Large cohort studies have repeatedly shown that the health benefit of regular exercise is dose-dependent with regard to total caloric expenditure[2] and intensity,[3] and thus vigorous activities were the focus of recommendations. Unfortunately, such recommendations have not resulted in a greater percentage of the population becoming more active.[4]

In 1995, an expert committee on exercise and health convened by the Center for Disease Control (CDC) and the American College of Sports Medicine reviewed the available data with the goal of establishing a new consensus guideline designed to encourage the ever-growing sedentary population to begin some form of regular exercise. Close examination of data from prospective studies revealed that a caloric expenditure of approximately 1500 kcal/week was the minimum threshold of activity providing a health/survival benefit.[4,5] More importantly, it was determined that daily or near daily performance of moderate intensity activities could achieve this goal. This prompted a major change in the exercise message, which now stated "Every US adult should accumulate 30 minutes or more of moderate intensity physical activity on most, preferably all, days of the week".[4] The scientific merit of this recommendation for the general population has been debated,[6] and opponents argue that there is much stronger evidence supporting a health benefit from vigorous exercise for non-sedentary individuals.

The authors of the CDC recommendation admit that the new guideline focuses on the least fit individuals who are unlikely to become involved in more vigorous levels of activity, and they acknowledge a strong likelihood that vigorous exercise and greater weekly energy expenditures provide greater benefit.[4] From a public health perspective, this approach is justifiable, as the most sedentary have the highest mortality burden.[7] However, for a general practitioner (GP) or practice nurse assisting an individual patient, close adherence to these guidelines may inhibit capable individuals from performing higher intensity activity, which provides greater health benefit.

In New Zealand, GPs appear to be less likely to recommend more vigorous exercise (unpublished findings from the Hillary Commission). Thus, the trend for exercise recommendations appears to be that as westernised society becomes less and less fit, recommendations are simply decreased, as exemplified by the National Health Committee of New Zealand, which recently stated that even 1000 kcal/week will provide a health benefit.[8]

Is less than 1500 kcal/week beneficial?

While there is some evidence to support the National Health Committee's claims, there is very little evidence that refutes them. The 'cut-offs' used for minimum energy expenditure in previous studies have seemingly been randomly assigned and thus may not accurately determine the minimum energy expenditure required for benefit. The MRFIT trial[5] stratified