Environment and Planning C: Government and Policy 2003, volume 21, pages 883 – 903

DOI:10.1068/c0240

Measuring neighbourhood deprivation: a critique of the Index of Multiple Deprivation

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Received 12 August 2002; in revised form 1 April 2003

Abstract. There is now a sustained interest in measuring geographical variation in social and economic circumstances in order to guide urban policy resource allocation decisions. The most recent attempt to measure local area deprivation in England has come through the government's Index of Multiple Deprivation (IMD). The authors aim to consider the degree to which the IMD provides a reliable mechanism for doing so and to suggest the ways in which its successors might best be refined. They argue that although the IMD, in many respects, represents a commendable advance in terms of the development of techniques to quantify deprivation, there remain significant limitations that future approaches could profitably address.

Introduction

There is now a long-standing interest in measuring geographical variation in social and economic circumstances to guide policy decisionmaking. The Formula Spending Share and its predecessor the Standard Spending Assessment—a formula-based approach to distribute central government funds to local authorities in England—provide examples of attempts to quantify local area circumstances as a means of determining objectively, if not without contention, the allocation of resources. A variety of indices of aggregate need or local circumstances across geographical areas has been used to channel flows of funding in relation to health, in particular, and for education and other areas of public policy (Mackenzie et al, 1998; P Smith et al, 2001).

Interest in quantifying spatial variation in need has been particularly prominent in the field of urban regeneration, as governments since the early 1980s have sought to develop formal statistical indices to distribute funding in line with geographical patterns of deprivation. Such indices have become progressively more intricate and elaborate as new data sources have come onstream (especially in spatially more disaggregated form) and as policymakers and academics have become increasingly sensitised to the difficulties involved in capturing concepts as multidimensional, complex, and contested as deprivation.

The most recent attempt to measure local area deprivation in England has come through the Office of the Deputy Prime Minister (ODPM) in the form of the Index of Deprivation 2000 (ID2000), part of which—the Index of Multiple Deprivation

(IMD)—focuses upon levels of deprivation in local authority wards[1]. The IMD, as we discuss below, has proved—as with any such tool to guide resource distribution—predictably contentious. It was used to determine the set of eighty-eight local authority districts eligible to receive Neighbourhood Renewal Fund monies from central government amounting to £975 million over the period 2001–06 and to receive additional resources through a raft of related policy measures under the government's National Strategy for Neighbourhood Renewal (Cabinet Office, 2001). It was also used, in an attempt to reinvigorate sluggish housing markets, by the Inland Revenue in order to identify a list of wards in England (defined as the 15% most deprived from the IMD) eligible for exemption from stamp duty payments applied to house purchases of under £150 000 (HM Treasury, 2001). It was also employed, again by the Inland Revenue, to identify the 2000 Enterprise Areas earmarked for additional business support and guidance (HM Treasury, 2002). In total, it is estimated that the IMD is used to assist in the allocation of funds from some thirteen policy initiatives across ten government departments (ODPM, 2002, pages 62–67).

The IMD clearly acts as an important tool to help pinpoint areas of socioeconomic distress and to guide flows of regeneration resources accordingly. Our aim in this paper is to consider the degree to which it provides a reliable mechanism for doing so and to suggest the ways in which its successors might best be refined. In doing so, we are alive to the fact that there is no perfect or incontestable means of defining or measuring deprivation. However, although the IMD in many respects represents a commendable advance in terms of the incorporation of newly available ward-based administrative data and in terms of its development of techniques to quantify deprivation, there remain significant limitations that future approaches could profitably address.

In the remainder of this paper we provide a critique of the IMD. We begin by summarising the methods adopted in constructing the IMD and by outlining in brief their rationale. Following this, we catalogue a series of methodological limitations that potentially limit its interpretability and arguably constrain the extent to which it can be utilised for policy purposes. First, we highlight the limited technical detail released with regard to some elements of the construction and composition of the IMD; second, we detail a series of general methodological limitations that call into question the suitability of the IMD for the policy purposes to which it has been put; and, third, we focus specifically on the implications the IMD poses for the measurement of deprivation in large urban areas. In doing so, it is important to note that our aim is not to offer a comprehensive appraisal of the statistical robustness of the IMD (for which see, for example, Chalmers, 2000) but to scrutinise its substantive coherence and the degree to which it meaningfully conceptualises and measures deprivation, with particular regard to urban areas. We conclude the paper by suggesting the broad thrust of refinements that could usefully be explored as part of future updates to the IMD.

The Index of Multiple Deprivation

Research to prepare the IMD was commissioned by the then Department of the Environment, Transport and the Regions (DETR) in 1998.[2] After a detailed consultation phase on the methods employed and indicators utilised, some of the data embodied

[1] Wards are the basic electoral divisions within each local authority district. There is substantial variation in the population size of wards in the 1991 Census, ranging from fewer than 1000 people to over 30 000.

[2] Responsibility for oversight of the IMD and subsequent updates to it was inherited in 2001 by the reconfigured Department for Transport, Local Government and the Regions and in 2002 was transferred to the Office of the Deputy Prime Minister.

in the IMD were released, and the final report was issued in 2000 (DETR, 2000a). The resultant index follows much of the approach developed in the earlier Index of Local Deprivation (ILD) (DETR, 1998): identifying a range of 'domains' or bundles of indicators that measure different aspects of deprivation and using measures at an array of spatial scales in order to reflect the complex geometry that characterises the patterning of deprived areas. The use (or estimation) of ward-based data has been one of the major contributions of the new index in comparison with the earlier indices which, in the absence of small-area subdistrict data, were restricted for the most part to data from decennial censuses of population and were compelled, as a result, to draw largely on district-level information for intercensus updates. At the same time, the IMD also usefully responds to long-standing difficulties in measuring income deprivation, drawing extensively on an array of benefit data from central government administrative records in an attempt to estimate the incidence of individual and household poverty across geographical areas (table 1, over).

For the IMD, as with any composite index, a sequence of steps was used in the calculation of values for wards and districts. Six policy domains were identified (income, employment, health deprivation and disability, educational skills and training, housing, and geographical access to services), each of which was measured through a range of individual indicators at the ward scale. Some of these ward-level indicators were drawn directly from small-area statistics; some (such as educational performance and absenteeism amongst primary school children, adults without qualifications, or poor-quality private sector housing stock) had to be 'modelled' to produce ward estimates derived from school-based data or national sample surveys; and some (such as the Comparative Mortality Ratios) were developed simply by assigning the relevant local authority district value to all constituent wards. As the final four domains contain a small number of unreliable figures, data for wards were smoothed by employing shrinkage estimation, in effect moving values with the highest standard error towards the (more robust) district average for that indicator. The first two domains (based on nonoverlapping welfare-benefits data) could be calculated simply by adding together the percentage component variables, because the benefit data refer to nonoverlapping categories of claimant; but the scores for the final four domains—indicators that were scaled on different metrics—were calculated on the basis of weights derived through a factor analysis. The six domain scores were then standardised (by taking the ranks for each ward) and were transformed by using an exponential distribution that gives greater weight to the more deprived places (that is, those with high ranks). Each domain was then weighted (with weights of 25, 25, 15, 15, 10, and 10, respectively; see table 1). The resultant ward values were then weighted according to the proportion of the district population therein and aggregated to generate a composite score for each of the 354 local authority districts in England.

Limitations of the index

The IMD is undoubtedly a valuable guide for informing the targeting of resources and policy initiatives to areas of particular need. It is used widely for this purpose both by government departments and by many local authorities. Given the increasing extent to which the IMD is employed for policy purposes, an understanding of its limitations becomes ever more critical. In the next sections, we detail in turn three aspects of the IMD that potentially could limit its usefulness as a policy tool: uncertainties surrounding its composition and construction; methodological limitations that could result in a misleading picture of the pattern of deprivation; and specific features of the IMD that could underestimate the level of deprivation in big cities.

Table 1. Domains and indicators in the Index of Multiple Deprivation 2000 (sources: DETR, 2000a; 2000b).

Domain/Indicator	Source	Year	Domain weighting
Income			
Adults in households in receipt of Income Support	DSS	1998	25
Children in households in receipt of Income Support	DSS	1998	
Adults in households in receipt of income-based Job Seekers Allowance	DSS	1998	
Children in households in receipt of income-based Job Seekers Allowance	DSS	1998	
Adults in households in receipt of Family Credit	DSS	1999	
Children in households in receipt of Family Credit	DSS	1999	
Adults in households in receipt of Disability Working Allowance	DSS	1999	
Children in households in receipt of Disability Working Allowance	DSS	1999	
Nonearning, non-Income-Support pensioners and disabled Council Tax Benefit recipients	DSS	1998	
Employment			
Unemployment claimant count	ONS	Mean of May, August, and November 1988 and February 1999	25
People out of work but on government-supported training programmes delivered by Training and Enterprise Councils	dfEE	1998	
People aged 18–24 years on New Deal options	ES	1998	
Incapacity Benefit recipients aged 16–59 years	DSS	1998	
Severe Disablement Allowance claimants aged 16–59 years	DSS	1999	
Health deprivation and disability			
Comparative mortality ratios for men and women at ages under 65 years	ONS	1997/98	15
Attendance Allowance or Disability Living Allowance recipients as a percentage of all people	DSS	1998	
Percentage Incapacity Benefit or Severe Disablement Allowance recipients aged 16–59 years	DSS	1998/99	
Age-standardised and sex-standardised ratio of people reporting limiting long-term illness	Census	1991	
Percentage of birth of low weight babies (less than 2500 g)	ONS	1993–97	

Table 1 (continued)

Domain/Indicator	Source	Year	Domain weighting
Education, skills and training			
Working-age adults with no qualifications	LFS	1995–98	15
Children aged 16 years or over not in full-time education	DSS	1999	
Proportion of 17–19 year olds who unsuccessfully applied for higher education	UCAS	1997/98	
Key Stage 2 primary school performance, modelled forwards	dfEE	1998	
Authorised and unauthorised absenteeism at primary schools, modelled forwards	dfEE	1998	
Housing			
Homeless households in temporary accommodation	DETR	1997–98	10
Household overcrowding	Census	1991	
Modelled estimates of poor private-sector stock	EHCS	1996	
Geographical access to services			
Access to a Post Office for claimants of means-tested benefits	General Post Office Counters	April 1998	10
Access to a food shop for claimants of means-tested benefits	Data Consultancy	1988	
Access to a GP for claimants of means-tested benefits	NHS and BMS	October 1997	
Access to primary school for all children aged 5–8 years	dfEE	1999	

Note: DSS, Department for Social Security (later Department for Work and Pensions); ONS, Office for National Statistics; dfEE, Department for Education and Employment (later the Department for Education and Skills); ES, Employment Service; LFS, Labour Force Survey; UCAS, Universities and Colleges Admissions Service; DETR, Department of the Environment, Transport and the Regions (later the Office for the Deputy Prime Minister); EHCS, English House Conditions Survey; NHS, National Health Service; BMA, British Medical Association.

Limited information on the construction and composition of the Index of Multiple Deprivation

The IMD clearly is an elaborate and carefully calibrated entity. However, assessment of its robustness (and the extent to which it represents an appropriate tool with which to determine policy decisions) is complicated at the outset by the limited technical detail about the construction of the index and by the limited availability of the 'raw' empirical data that fed into it. Many of the details of the methodology remain unclear from the two principal documents produced during the formal consultation exercise undertaken as part of the preparation of the index (Noble et al, 1999a, 1999b). For example, the way in which factor analysis was employed within four of the domains is insufficiently clear;[3] the precise implications of using an exponential transformation on the domain scores are not specified (Chalmers, 2000); and precise operational definitions of some indicators (such as the Comparative Mortality Ratios) are not provided.[4]

Alongside these general uncertainties, two particular aspects remain difficult to assess in the absence of detailed information of these types. One concerns the 'modelling' processes used in the case of a number of individual indicators to attribute to wards data that were collected at a district or national scale. At present, only the bare outlines of this modelling are provided, yet the modelling could have considerable impact on the index values, both at the ward and the district scale. For example, estimates of the scale of unsatisfactory private sector housing stock are fed into the index by modelling 975 observations, the number of unfit dwellings in an overall sample of 12131 dwellings surveyed as part of the 1996 English House Condition Survey across ten English regions. From these 975 observations, the model developed provides an estimate of the number of unfit dwellings for all 8414 English wards. The only information given in the consultation documentation is that the age and built form of the local dwelling stock, the economic circumstances of the local population, and national patterns of poor housing are used as predictors in the estimation model. However, this represents limited information with which to validate the accuracy of the indicator. In order to develop a meaningful cross-check of the robustness of the indicator, one would need complete details of the estimated number of unfit dwellings for each ward, and the precise methodology employed in the estimation model (such as the 'explained' variance of the model and the residuals from it, rather than the limited comments on local economic circumstances and the built form of the local stock). Such an approach seems curiously at odds with the thrust of general government thinking on the apparently limited extent to which national survey data should be utilised to estimate small area information:

> "In non-Census years much of the information gained from the Census is supplemented through surveys commissioned by Government ... [that] ... can be used in limited ways to gain an insight into conditions in deprived neighbourhoods. However, information on the social conditions of small areas may be of restricted use due to the limited coverage of surveys, and the small size of samples" (Cabinet Office, 2000, page 22).

[3] As Chalmers (2000) notes, it is unclear whether the outputs published from the factor analysis show the factor loading matrix (indicating the theoretical independence of the measured domain attributes from the underlying hypothetical deprivation measure) or simply the correlation between the estimated domain score and the measured indicators.

[4] There is no detailed explanation of how the Comparative Mortality Ratio (CMR) indicator differs from the more widely-used Standardised Mortality Ratio (SMR). In work by the IMD research team for the Welsh Assembly, the entire IMD methodology was duplicated, with the exception that CMR was replaced by SMR (Noble et al, 2000c).

At the same time, the second area that remains difficult to assess is the contribution of individual indicators to the overall value of each domain. The ODPM—perhaps somewhat surprisingly in light of its earlier provision of ward population estimates as part of the IMD consultation exercise—appears to have opted not to make readily available ward estimates for indicators such as primary school performance, geographical access to services, or unsatisfactory private sector housing stock. Yet without such ward values, it is almost impossible to develop detailed evaluations of their accuracy (for example, in light of whatever locally held administrative or survey-based data are available), the effect of smoothing (shrinkage), the impact of the use of ranks and exponentials to standardise and transform, and the effect of alternative weighting of the domains.

Even in the absence of comprehensive data, however, there are some significant limitations that potentially call into question the usefulness of the IMD. These are divided here into two categories, each of which we assess in turn in the following two sections: first, we look at areas of general concern that could conceivably distort 'real' patterns of deprivation; and, second, we examine elements of the methodology that could systematically underscore the level of deprivation in big cities.

General methodological limitations

Perhaps the most obvious potential inaccuracy implicit in the IMD centres on the double counting of some indicators across more than one domain. One example is provided by the use of Incapacity Benefit and Severe Disablement Allowance (SDA), which are used identically in the employment and health domains. The response proffered as part of the formal consultation appears to suggest that criticism of this sort misunderstands the essence of double counting:

> "Because the Index is constructed in a way which treats different deprivations separately rather than in combination, it is appropriate to count the multiple deprivation in this indicator as two different single deprivations" (Noble et al, 2000a, page 14).

This response, it could be argued, confuses two quite different issues: the concept of multiple deprivation, which recognises that an individual may be deprived on a variety of measures, and the problem of double counting, which dictates that identical measures should not be used more than once in any composite index. As, ultimately, the six domains in the index are aggregated into a single district score, the criticism of double counting is an important one [and one which, given the omission of the Incapacity Benefits and SDA measures from the consultation document accompanying the initial stage of the 2003 update to the IMD, has been recognised (ODPM, 2002, page 34)]. Were the domains to have been used separately, there would be obvious legitimacy in employing the same indicator in more than one domain (while avoiding, as the IMD in its current form helpfully does, double counting within domains). But as the index typically is used for policy and resource purposes, at both the district and the ward scale, as an aggregative measure of deprivation that combines scores from all domains, it is impossible to refute the contention that double counting undermines its overall veracity.

Perhaps the most fundamental question mark against the reliability of the IMD centres on the way in which the weightings have been derived for its constituent domains. The precise basis for using weights of 25, 25, 15, 15, 10, and 10 for the six domains is never clarified, beyond the assertion that "the weightings to combine domain scores was *not* to be the product of a statistical exercise but included a value judgement" (Noble et al, 2001a, page 7; emphasis in original). Although there may be an argument for viewing the assignment of weights as a justifiable political (rather than technical) decision, the variable

reliability of data is also cited as further justification for the weights employed: "the domains with the most robust indicators should be given the greatest weight" (Noble et al, 1999b, page 26). Yet this weighting, as Chalmers (2000) demonstrates, is critical in the derivation of the index values and has important policy implications in that, despite not unreasonable expectations to the contrary from the research team responsible for preparing the index, resource allocation decisions are based almost entirely on composite values rather than domain scores. In light of this, it is perhaps surprising that an overall factor analysis of the whole set of indicators is never shown in the documentation accompanying the IMD. This would have indicated the degree to which the six factors are or are not independent of each other. It could have provided one form of justification for using weights (as, indeed, is done in calculating weights for indicators within four of the six domains). As it is, the income and employment domains are very highly related to each other, the health, education and housing domains are fairly closely related to the income and employment domains, and the access domain is negatively related to each of the other five domains.

In the response to the consultation process, some evidence is provided to illustrate the effect of the use of six different combinations of weights, but in all cases the alternatives examined involve giving even greater weights to the income and employment domains (varying from the existing 50% up to 75%). Unsurprisingly, it is concluded that there are high correlations between the six alternatives. Yet, as demonstrated by Chalmers (2000), the sheer number of observations across all English wards makes it almost inevitable that there will be high correlations between the six alternatives, even though in practice there are large differences in the rankings of individual areas.

In short, it could be argued that the weighting scheme used is not underpinned by any theoretical or statistical justification. As Chalmers (2000) contends, it is arbitrary (notwithstanding the reference to the variable reliability of data across domains) and subject to the judgement of policymakers and the researchers involved. Yet, as Gordon (1995) and Saunders (1998) note, the question of weighting is of critical importance in influencing allocations of resource. In light of the substantial influence the choice of weights is likely to have on composite scores and on the resulting funding decisions, it is surprising that this aspect of the index appears to have been determined without recourse to the intricate technical considerations that characterise much of the rest of the methodology employed.

The application of weightings provides one instance of a somewhat crude facet of an otherwise commendably sophisticated and elaborate attempt to quantify levels of deprivation. Given the novel and imaginative way in which many of the indicators have been developed, this can only be viewed as surprising. A similar criticism can be applied to the process by which domain scores are converted to overall district scores. The scores for four of the domains (the exceptions being the income and employment domains) are calculated through a complex series of weightings (shrinkage, and factor score weights), and, whatever its merits or weaknesses, this methodology does at least include an attempt to measure the scale of differences between places. However, when the ward values are aggregated to districts, this is done simply by ranking values (and applying an exponential transformation), with the consequent loss of information about the scale of differences between the scores of places. The fact that the distributions of scores may differ from domain to domain is ignored, further reducing the amount of information that can be gleaned from the IMD and reducing its usefulness as a policy tool. At the same time, this drawback also compromises the transparency of the index. The complex sequence of changes means that information is lost and created in a somewhat opaque fashion. This is a problem that is compounded, moreover, by the limited availability of the relevant raw data with which to undertake sensitivity

analysis or to inform more general debate and discussion about the IMD. These can be seen as representing significant weaknesses for a policy tool that professes to be comprehensible and user friendly

Limitations relevant to large urban areas

There is a suggestion, then, that the IMD is constructed in such a way as to give rise to concern about its reliability as a mechanism for guiding the distribution of significant amounts of public resources. Alongside this range of general limitations and uncertainties, additional concerns relate to the implications the index poses for the larger urban areas upon which regeneration policy assistance in England has traditionally focused. In the remainder of this section on limitations, we explore the contention that, in its current form, the IMD militates against deprived areas located in the major cities of England.

The IMD differs from earlier deprivation indices in that it has been designed ostensibly to measure a range of different forms of deprivation, moving beyond the relatively narrow concept of 'urban' deprivation in an attempt to capture problematic socioeconomic circumstances characteristic of other types of area, such as ex-mining communities, coastal resort towns, or rural areas. This shift in emphasis takes account of powerful evidence to suggest that earlier indices frequently devoted insufficient attention to the difficulties afflicting such areas, or provided a misleading depiction of circumstances within them [for example, on ex-mining areas, see Beatty et al (1997); on measuring rural disadvantage, see Higgs and White (2000) and Hodge et al (2000)]. (However, such a criticism ignores the fact that earlier indices such as the ILD were deliberately geared towards the measurement of specifically urban forms of deprivation, as a means of informing urban policy decisionmaking.) The shift also reflects more nakedly political pressures for government to divert resources beyond the major cities, the most potent of them centring on the influential arguments proffered by a disparate coalition of rural interests. It also reflects a more general trend in regeneration policy over the course of the 1990s, which saw the advent of initiatives such as the Single Regeneration Budget Challenge Fund, the vaunted 'flexibility' of which was intended to channel resources beyond traditional 'inner-city' areas, reflecting what was seen as a more intricate geography of deprivation than had previously been assumed.

These three sets of pressures, it seems not unfair to assert, would have doubtless influenced politicians' and civil servants' views about the nature and composition of the IMD. There are four specific sets of issues with regard to the construction and content of the IMD that may be interpreted as reinforcing the view that it systematically downplays the extent and intensity of deprivation in the major urban centres.

The first centres on the *size of the deprived population*. The IMD takes no account of the overall size of local authority district populations or of the scale of the absolute numbers of deprived people therein, yet there is a strong argument that the needs of an area will be greater the larger (in absolute terms) its deprived population. Having 30% of residents or households classified as deprived has different implications for a district of 200 000 than for one of 20 000. This idea is rejected by the researchers, who refer to a methodology that is independent of population size.

Curiously, the size effect is recognised in the IMD, but only at the ward scale. It takes account of the different size of wards in aggregating domain scores into a district value by using population weighting to sum the domain scores across the set of wards within each district. But, perhaps surprisingly, no allowance is then made for the differences in district populations. This systematically discriminates against the typically larger metropolitan districts: a 30% level of deprivation equates to considerably

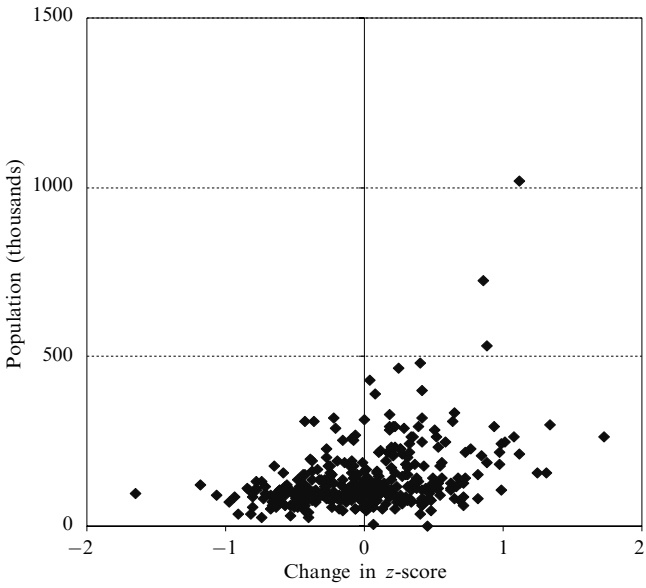

Figure 1. The relationship between population size in 1997 and change in the deprivation score of districts. Note: districts to the right of the vertical zero line are scored as less deprived in the IMD 2000 compared with in the ILD 1998; those to the left are scored as more deprived; the difference in the deprivation scores is measured in terms of differences in the standardised scores of the two measures.

larger numbers of deprived people in a London borough than in a small shire district. At least some part of the difference between the earlier ILD and the IMD—notwithstanding the differing configurations of indicator used in each—derives from the failure in the IMD to take district populations into account. This is suggested in figure 1, in which we show the relationship between district size and changes in the overall district index. Although there is considerable variation, the majority of districts of over 200 000 people show lower levels of deprivation in the IMD than in the earlier ILD.

A second feature of the IMD that potentially militates against large urban areas is its *emphasis on benefits*. The IMD is heavily reliant on benefit-recipient data, much of which came onstream during the late 1990s and which has been used to good effect to generate subdistrict information on a variety of aspects of deprivation previously available only in sufficiently robust form through censuses of population. However, a powerful case can be made that the reliance on benefit data is to the exclusion of wider elements of deprivation, and that some attempt might have been made to offset the undercounting of 'entitled nonrecipients'. Such a case is reinforced by the fact that the methodology used in the IMD exaggerates the emphasis in a number of ways:

(a) The weighting of domains means that no less than 50% of the overall IMD score is the product of the income and employment domains, both of which are dependent entirely on benefit-related information.

(b) The 'shrinkage' of ward values towards the district mean (which is applied only to the four domains other than income and employment) has the effect of reducing the variance of the nonbenefit indicators and hence reduces still further the potential contribution of nonbenefit aspects of deprivation.

(c) The access domain is determined by those residents who are on benefits (with the exception of access to a primary school, for which all 5–8 year old children are taken into account), not those who are deprived in any other way.

All of this means that the index is critically dependent on the reliability of benefit data as a measure of deprivation. The initial proposals for the 2003 update to IMD suggest that this benefits bias is likely to be accentuated, with the introduction of new indicators based on low-income recipients of Working Tax Credit and Disabled Persons Tax Credit (ODPM, 2002). However, as the authors of the documents accompanying the preparation and release of the IMD have been quick to acknowledge on numerous occasions, there are problems associated with differential take-up of benefit (for example, see Noble et al, 1999a, page 11; 1999b, page 5; 2000b, page 6; ODPM, 2002, page 16). But, although there is recognition that take-up varies according to socioeconomic and demographic characteristics, by type of benefit, and by geographical area, no mechanism for offsetting this has been developed (Noble et al, 1999a, page 11; ODPM, 2002, page 16). However, if there are grounds for believing that there are *systematic* differences in take-up, it is difficult to gainsay the conclusion that there needs to be some attempt to take this into account. What evidence there is suggests that lower levels of take-up are strongly associated with more prosperous areas, particularly amongst the elderly (for example, see Bramley et al, 2000). Across a range of benefits, it is clear that there are substantial numbers of entitled nonrecipients (table 2). Although part of the shortfall in take-up shown by the data reflects administrative delays in processing benefit claims, or delays by claimants in submitting them (DWP, 2001, page 5), there remains a strong suspicion that propensity to claim is markedly associated with certain client groups, types of area, or housing tenures. For example, the percentage of single females entitled to but not in receipt of the income-based Job Seekers Allowance is between 50 and 64 (DWP, 2001).

Table 2. Estimated caseload-based take-up of benefits, 1999/2000 (source: DWP, 2001).

Benefit	Estimated percentage range	
	all	pensioners
Income Support	77 – 87	64 – 78
Housing Benefit	89 – 95	85 – 93
Council Tax Benefit	73 – 80	64 – 70
Job Seekers Allowance[a]	67 – 78	

[a] Income-based

It is acknowledged that reduced take-up potentially represents a problem for the IMD. It is recognised, in particular, that the elderly typically exhibit a reduced predisposition to claim Income Support, and thus the index includes data on Council Tax Benefit—for which underclaiming is less marked—as an alternative. Beyond this, however, the position of the research team in light of comments received as part of the consultation exercise is that:

> "While take-up may vary by area, the administrative data remains a nationally recognised and up-to-date measure of low income for all areas in England ... [W]e have not adjusted the domain to take this into account ... as this take-up data is only available at a national level it would have meant making a very crude adjustment to this domain" (Noble et al, 2000a, page 6).

Such a conclusion might well be seen as surprising in light of the heroic efforts made elsewhere in the IMD to generate estimates of ward data on the basis of relatively small national surveys. It may have been possible, for example, to make adjustments across areas on the basis of known variations amongst different sociodemographic groupings. Such an adjustment need not have been 'crude', and it remains unclear precisely why such a course of action was rejected.

Given Bramley et al's (2000) findings [and those in earlier studies, which suggest spatial variability in the disbursement of local-authority-administered benefits (see Kemp and McLaverty (1994)], there are two aspects that, in the absence of any attempt to offset undercounting, continue to have potentially injurious implications for the measurement of deprivation in large cities generally, and perhaps for economically buoyant cities such as London in particular. First, in the context of relatively healthy urban economies, it is conceivable that there may be greater opportunity for the unemployed to exploit the opportunities available through the informal economy. This may have the effect of reducing the numbers of people who claim unemployment-related benefits, with the consequence that the IMD would fail to capture the circumstances of people who could still be deemed deprived. For example, one study of domestic service work in London suggests that benefit entitlement rules (and the way in which they are administered) has encouraged the growth of the informal sector, particularly in affluent parts of central and northwest London (Cox, 2000). Although some part of the growth of informal economic activity in such a way would doubtless mean that some impoverished individuals and households would cease so to be—and although at least some will work and claim benefit simultaneously—it is by no means implausible that there would remain a substantial number in impoverished circumstances but missed by statistics defining income deprivation narrowly on the basis of benefit take-up.

Second, given the suggestion of lower benefit take-up in more affluent urban areas and amongst the elderly, this would work to the detriment of some large urban districts; both those that are more affluent and those with larger proportions of poor elderly, there being consistent evidence from Income Support data that the big cities have larger than average proportions of elderly poor (even though not of elderly as a whole). In figure 2(a) it can be seen that the proportion of pensioners on Income Support is higher in inner London, the metropolitan areas, and the larger nonmetropolitan towns and cities. In figure 2(b) it can be seen that, even as a proportion of the total population, pensioners receiving Income Support are generally more numerous in inner London and the metropolitan districts. If take-up is lower amongst the elderly, the heavy dependence on benefits in the IMD would clearly work to the disadvantage of such areas.

A third aspect of the IMD that potentially militates against large urban areas is its method of measuring *accessibility to goods and services*. Although it accounts for a relatively low weight (10%) within the composite index, the use of the access domain seems particularly inappropriate for measuring differences across urban areas because variations in access are as much a result of sociocultural constraints as of physical distance per se. Differences between levels of straightline, distance-related access within urban areas are unlikely to be sufficiently reliable to enable any meaningful interpretation [although the possibility of measuring access according to distance by road, as mooted for the 2003 update of IMD (ODPM, 2002), would at least partially offset this]. Straightline—or road-based—distances may be more interpretable in the context of lower density rural areas where crude physical distance is more likely to represent an impediment to the utilisation of goods and services, but this might suggest that the most appropriate decision would be to develop an index with components that differ for 'rural' compared with 'urban' areas (although it is important to acknowledge that the index team was specifically tasked by government to develop a single index for both types of area).

Alongside this general reservation, there are some specific concerns about the way in which crude physical distance is employed in the IMD. For example, distance to a primary school (one of the variables used in the access domain) does not imply that the

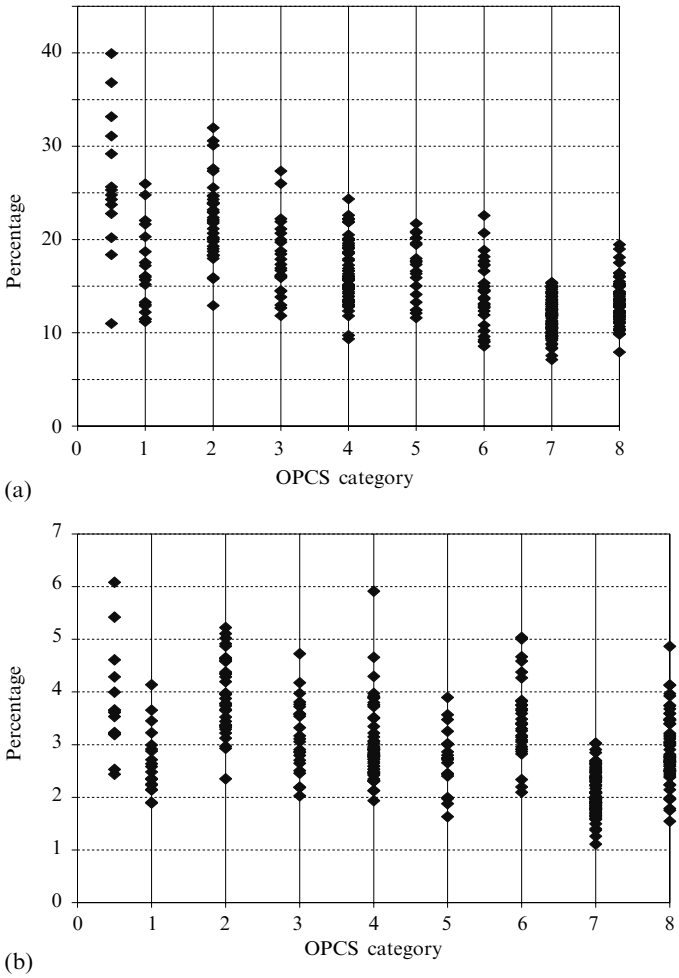

Figure 2. (a) Percentage of pensioners on Income Support and (b) number of poor pensioners as a percentage of population, by type of local authority district. Note: The categories set out by the Office of Population Censuses and Surveys (OPCS) are as follows: 1, London (inner London boroughs are shown to the left; outer London to the right); 2, metropolitan districts; 3, main nonmetropolitan cities; 4, industrial districts; 5, new towns; 6, resort districts; 7, mixed urban – rural districts; 8, remote rural districts.

quality of educational provision is necessarily adequate. An uninformed reading of the index could imply that a resident five miles from a high-performing school is more deprived than an urban resident one mile from a 'failing' school. Similarly, in a ward with a high degree of ethnic, religious, or cultural mix, the nearest primary school may not be a realistic alternative, and real access might be substantially overestimated.

It seems surprising, moreover, that no attempt appears to have been made to address the manifestly bipolar distribution of observations for scores on the access domain. Here, one possibility would have been to disregard nondeprived values on the access domain, thereby minimising the effect on the largely urban set of areas for which physical distance constraints are less marked (as well as less meaningful). As it is, the incorporation of the access measures is likely to have a disproportionate effect on large cities because of the standardisation and transformation techniques used in the index. Because district scores are ranked and then transformed to give extra weight

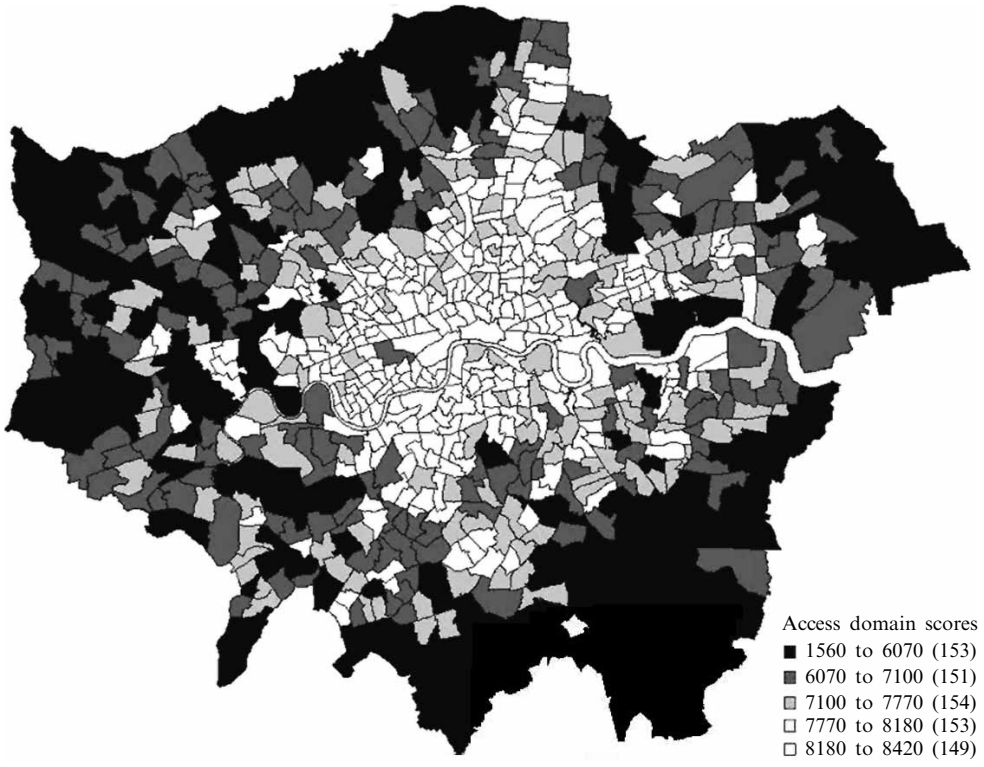

Figure 3. Geographical access to services: London wards (source: Index of Multiple Deprivation). Note: wards are grouped into quintiles, with heavier shading denoting areas of higher deprivation on the overall scores for the IMD access domain.

to high ranks, any low-scoring domain (for a district that otherwise has high scores on other domains) will disproportionately lower the final aggregate value for that district.

Doubts about the use of the access domain are reinforced by the fact that it is negatively related to all the other indicators used in the index. Although this could imply that a distinct, and hitherto ignored, aspect of deprivation is being captured (for example, see ODPM, 2002, page 19), the scores on the access domain for London wards show that those areas that have high levels of access deprivation are generally the outer wards in which (with the not unimportant exception of some outlying peripheral local authority housing estates) residents are least deprived (figure 3). It could be argued that to be access deprived in an affluent area is worse than being access deprived in a deprived area (because of the poorer provision of public transport), but if this were the basis for including the domain the measure should take account both of the actual provision of and dependence on public transport and of the quality of the services themselves. Moreover, as the data (with the exception of access to a primary school) apply only to those on income-related benefits,[5] rather than using the values in an unweighted form, a more logical approach could be to weight the access values by the fraction of the total population of a ward that is in

[5] The consultation document accompanying the 2003 update to the IMD suggests that future revisions to the access domain could include extending it to measure accessibility for all income groups and not just those in receipt of benefit, although it is also asserted that poor access is experienced by all groups "regardless of income status" (ODPM, 2002, page 44).

receipt of the relevant benefits; otherwise, at the extreme, for two wards with similar levels of access, one in which only a single person receives benefits would be given the same value as another in which all the population receives benefits.

The fourth—and perhaps most critical—limitation of the IMD is its exclusion of crime and degraded physical environments as aspects of deprivation (Cabinet Office, 2000, page 22). These two domains could be argued to be the (urban) converse of (rural) inaccessibility, as used in the index. There is a welter of evidence dating back over many years to suggest that crime levels are correlated to deprivation and to problematic neighbourhood contexts (for example, see Baldwin and Bottoms, 1976; Braithwaite, 1979; Morenoff et al, 2001; Sampson and Groves, 1989). Evidence from reported crime data suggests that London (and the big cities) have significantly higher crime levels than the norm, with the Greater London (Metropolitan) and Greater Manchester police areas showing the highest levels of offences of all forty-three police force areas in England and Wales in 1999/2000 (Hirschfield et al, 2002). Here, it is important to acknowledge the considerable difficulties involved in measuring crime at a ward scale as, amongst other things, the British Crime Survey (BCS) is based on a small sample that is not robust at a district scale, let alone for wards. Nevertheless—and somewhat inconsistently—the IMD elsewhere utilises national surveys with relatively small sample sizes (such as the English House Condition Survey and the Labour Force Survey) to model ward rates for indicators in other domains. In light of the contention that the exclusion of a crime domain from IMD was "not an omission through choice" (ODPM, 2002, page 45) it appears surprising that there was no attempt to repeat such modelling exercises in respect of crime. Data on reported crime for basic command units, the most disaggregated level available throughout England, were available during January 2000, shortly after the final consultation phase began in December 1999, and it may, in retrospect, have been sensible to incorporate the relevant data prior to publication of the final index, especially given the possible ramifications of their exclusion for some urban areas. It would also have been possible, moreover, to model data, drawing on the BCS, for use at a district scale (although the ward scale would remain intractable because of the relative scarcity of some types of criminal occurrence and the limited georeferencing of BCS data).

Equally, the exclusion of any measure of poor physical environment works to the disadvantage of urban areas. Again, there are available measures that could have been incorporated as measures of poor local environments. The decision to eschew the use of data from the Derelict Land Survey (which, at the time of the construction of the index, was available only for 1993) is clearly justifiable, but the National Land Use Database (NLUD) might have provided an alternative means of depicting patterns of environmental degradation. Despite the incompleteness of its (publicly available) coverage at a district level, disaggregated data on site characteristics could have been readily utilised to provide a measure of physical dereliction at the ward scale. That the less robust district-level data were already considered, at the time of the release of the index, to be sufficiently comprehensive to estimate brownfield land capacity to inform housing land allocation throughout the country gives further confidence that future indices should seriously consider the possibility of utilising disaggregated data on derelict sites.

A similar argument can be developed in relation to data on air quality—the corresponding element of wider environmental degradation. There is already evidence, from case studies of Greater London and Birmingham, that the geography of atmospheric air pollutants is strongly correlated to deprivation as measured by the IMD, though, unsurprisingly, not to the access domain (Pye et al, 2001). In light of this, it would be feasible for future deprivation indices to develop small-area scale estimates of

air pollution from 1 km^2 maps based on 1998 emission data held as part of the National Atmospheric Emissions Inventory and that have been modelled to produce pollution surfaces. Relevant data are now readily available for an array of pollutants: carbon monoxide, oxides of nitrogen, sulphur dioxide, total volatile organic compounds (VOCs), chromium, arsenic, cadmium, copper, mercury, nickel, lead, selenium, vanadium, zinc, benzene, 1,3-butadiene, and PM_{10} particulates[6]. Even allowing for the argument that, because of its adverse medical impacts on individuals, air pollution would be more appropriately accommodated in the health domain (see ODPM, 2002, page 47), there is a clear case that it be embodied somewhere within the IMD.

In many ways, the omission of these two domains reflects the predominant geographical scale at which the index has been conceived. Deprivation can be conceptualised at different levels: individual, household, neighbourhood, and the wider environment. The IMD incorporates individual and household levels, and its logic seems implicitly to be based exclusively around a view that deprivation applies (and can be understood) solely, or at least largely, at these levels. It appears, conversely, to ignore the neighbourhood level, associated, for example, with the fear of crime rather than just its incidence, with poor access to jobs rather than simply the incidence of unemployment, and with a degraded physical environment rather than just problematic housing conditions. Yet the neighbourhood context can be critically important in deprivation. For example, recent housing literature clearly acknowledges that, in addition to the aggregate of individual and household socioeconomic circumstances, it is the wider neighbourhood environment that has led to low demand for, and the incipient abandonment of, some northern housing estates (for example, see Mumford and Power, 2003; Power and Mumford, 1999). The use of multilevel modelling to examine school performance follows the same logic: different levels of environment, rather than just individual and household characteristics, shape the propensity of children to succeed in school performance. It is an unduly narrow view to restrict the conceptualisation of deprivation to the individual and household levels and ignore the effect of the neighbourhood, as Lupton and Power (2002, pages 118 – 119), in a perceptive review of the neighbourhood component of housing-related social exclusion, suggest:

> "The concentration of problems in particular neighbourhoods is not coincidental ... the nature of neighbourhoods actually contributes to the social exclusion of their residents ... [N]eighbourhoods have intrinsic characteristics ... [That] ... impact directly on individual residents ... [They] can also impact ... when many people clustered together are similarly disadvantaged ... Once this concentration of disadvantage is established, neighbourhoods can acquire even more damaging characteristics."

Although there is acknowledgement by the IMD authors that deprivation does have a neighbourhood component (G Smith et al, 2001), in the document accompanying the early stages of the 2003 update it is still suggested, in some sections, that there is a commitment to a view that, although there is some legitimacy to arguments that area effects are relevant in terms of the conceptualisation of deprivation, the quantification of such effects can be based only on household and individual measures:

> "No assumption has been made regarding the possibility of area effects in the ID2000, as it is an empirical question as to whether such effects exist. The conceptual framework [adopted for the proposed 2003 update to IMD] proceeds from the premise that deprivation is ultimately experienced by individuals and hence that it is theoretically possible to account for the entirety of deprivation by measuring individual experiences" (ODPM, 2002, page 12).

[6] PM_{10} particulates are particles of less than 10 μm in diameter.

Part of the significance of the limited importance apparently accorded in the IMD to the neighbourhood scale of analysis centres on the differential effect on urban and rural areas. In general, the IMD is an index based on individual and household deprivation and not neighbourhood deprivation, even though the ward [and in the 2003 update, possibly subward areas (ODPM, 2002, page 51)] is the reported unit of analysis. This is despite the fact that much of the current neighbourhood renewal policy that the index is intended to inform is based around areas sometimes of not dissimilar size to wards. This stems in large measure from the reliance upon benefits data for indicators within the index. It is the principal reason why it is argued that all wards have some level of deprivation because they have some individuals or individual households experiencing some degree of deprivation living within them.[7] In an alternative approach it might have been argued that wards have different degrees of deprivation and that despite having small absolute numbers of deprived people within them they cannot be categorised as 'deprived wards'.

Conclusions

In this paper we have attempted to delineate a number of limitations to the IMD. Criticism of this sort, it is worth reiterating, is unavoidable, as the experience of the predecessors of the IMD testifies [for example, see critiques of different aspects of the earlier indices of conditions and deprivation by Connolly and Chisholm (1999); Henderson (1994); Lee (1999); Simpson (1996)]. As Mackenzie et al (1998) demonstrated, dramatically different results for the same set of wards can be obtained if indices that employ differing methodologies are used. The construction of any deprivation index, it is clear, is fraught with difficulties, and there is no 'gold standard' against which one index can be compared with another—not least, as in the case of IMD, where an index is constructed at a spatial scale for which relatively little robust direct data are available. Some of the criticisms directed at the IMD can readily be rebutted on the grounds that lack of data makes it impossible to develop a 'best' index and that the IMD represents a commendable (and perhaps unsurpassed) attempt at approximating 'ideal' data. Many of the criticisms levelled at the IMD were refuted as part of the extensive formal consultation exercise that accompanied the research project (as is clear from Noble et al, 2000a; 2000b) and as part of the parallel academic debate that is beginning to emerge (for example, see Noble et al, 2001b). Some—such as the double counting of some benefit-related measures in more than one domain—were also addressed as part of the first stage of the consultation accompanying the 2003 update to IMD (ODPM, 2002). However, it remains helpful to catalogue the limitations of the index in order to inform future refinements embodied in any successor indices.

Despite its valuable innovations, then, there are several important grounds on which one can argue that the IMD is a limited tool with which to guide the disbursement of urban policy monies and other extraurban regeneration resources. In part, such a conclusion is unsurprising given the unavoidably contested nature of any such index and of any resource allocation decisions. However, there is also a case to be made that the IMD is part of a wider, and as yet incipient, trend towards underplaying the need for additional central government resources to be directed on a geographical basis to those urban areas deemed to be in greatest need. Such a philosophy has formed the cornerstone of a succession of policy interventions—mainly from the Department of the Environment and its successors—since the advent of the Urban Programme in 1968.

[7] This also explains the attempt in the IMD to employ an exponential transformation to limit to no more than about 10% the cancellation effect that can apply to a ward where negative scores on one domain counter positive scores on another.

Government continues to pursue a similar approach in England, strengthened since the change of administration in 1997, through the National Strategy for Neighbourhood Renewal. However, its longer term aspiration, it could be contended, is to phase out targeted spend of this type by ensuring that mainstream service budgets, from both central and local government, begin to focus more clearly on needy areas. This goal is central, for example, to the New Deal for Communities and the Neighbourhood Renewal Fund programmes. Such an aspiration has to be treated with a degree of scepticism given the immense difficulties of previous administrations (for example, through the Action for Cities initiative of the late 1980s) in effecting this 'mainstreaming', but it remains the case that the long-term existence of a targeted urban policy is by no means guaranteed. In this light, the fact that the IMD appears in some respects to discriminate against the larger urban centres begins to acquire a rather more worrying resonance. Although one cannot, of course, criticise the researchers responsible for the preparation of the index with such a shift in policymaker thinking, it is important nonetheless not to divorce consideration of the methodological strengths and weaknesses of IMD from the policy and political context in which it exists.

This is a conclusion that is reinforced by the implicit conception of deprivation within the index as fundamentally an individual and household phenomenon rather than a multidimensional phenomenon that also functions at the (geographical) neighbourhood scale. Perhaps in response to long-standing concern regarding the appropriateness of focusing policy assistance upon needy areas at the expense of needy people (for example, see Fieldhouse and Tye, 1996; Kleinman, 1999; McCulloch, 2001; Sloggett and Joshi, 1994; Townsend et al, 1988), the IMD is heavily reliant on individual and household indicators, such as the incidence of various types of benefit recipient, at the expense, as we have seen, of areal or neighbourhood measures of deprivation. This is in spite of an array of evidence confirming the importance of 'neighbourhood effects' [for example, for a synoptic review of area effects, see Atkinson and Kintrea (2001)]. The IMD, it might be inferred, reflects an underlying and questionable supposition amongst policymakers that deprived places are simply the sum of the deprived people within them, and that it is more efficacious to direct policy assistance directly towards people. The converse argument, if one accepts the importance of neighbourhood-level effects alongside individual and household aspects of deprivation, is that it is perfectly legitimate—and, indeed, desirable—for people-based and place-based policy to exist in tandem. And, even if one acknowledges the enduring criticism that deprived places exclude many or most of the most disadvantaged people and contain many non-deprived residents, it is nonetheless plausible to argue [as Kleinman (1999) does] that area-based approaches, complementing national policy, can be justified on the grounds of the scope they give for policy experimentation, for the development of community capacity and citizenship, and for bolstering endogenous growth factors such as education and skills.

Such a contention is given added weight, moreover, by evidence to suggest that although there is considerable turnover in households in poverty—only 3% of the working-age population in the British Household Panel Survey of residents in the United Kingdom were unemployed (or otherwise excluded from the labour market through long-term sickness, premature retirement, or disability) for eight consecutive years (Burchardt et al, 2002)—the set of neighbourhoods in which many such households live 'churns' much less markedly: deprived people may change over time, but deprived neighbourhoods vary much less. Given the likelihood of policy assistance targeted at individuals failing to keep pace with such rapidly changing household circumstances (most conspicuously so for those who dip fleetingly into poverty), there continues to be a powerful case in support of the maintenance of complementary policy that focuses on places as well as people.

This is a conclusion that throws into sharper focus the need for central government to clarify the purposes to which the IMD and its successors are put. For example, it is clear that there are strong grounds for arguing that urban and rural deprivation, although typically conceived as opposite poles of a continuum, are in some respects qualitatively different entities and that to quantify them collectively cannot be justified. The development of separate indices would be likely to go some way to addressing the potentially antiurban dimensions that we have attempted to chronicle in this paper regarding the current index. Equally, one can argue with some justification that government ought to devote more effort to ensuring that such indices are utilised in an informed and meaningful way. At no point in the various consultations undertaken as part of the development of the IMD did there appear to be anything beyond perfunctory discussion of the use that might be made by funding bodies of the various permutations of index values. This was clearly not the responsibility of the index research team, but for local authorities it is manifestly of some importance to know how the IMD would or might be used in informing funding decisions.

This is also an issue that impinges on methodological questions. For example, if separate domains are used to inform decisionmaking, questions about double counting of indicators across domains are not an issue; if, however, some form of composite score is used—as has indeed proved typically to be the case—then double counting across domains becomes a critical issue. Again, the guidance offered by government on the use of the IMD—for example, in the otherwise helpful 'user-friendly' summary document (DETR, 2000b, pages 17 – 20)—is less than comprehensive in this respect. Likewise, as the IMD is essentially built up from ward values, there is an implicit suggestion that targeting of resources might be at a neighbourhood scale and that the careful calibration of ward estimates is therefore a vital component throughout the index. If, however, resource decisions are to be made at a district level, there would have been greater scope to incorporate the much wider range of indicators available at a district scale and to use them to augment the less abundant (and often less reliable) range of subdistrict data.

Reassuringly, successive governments in recent years have proved commendably receptive to a variety of arguments and suggestions about the ways in which indices of deprivation might best be improved. The result has been increasing innovation and sophistication in the construction of such indices. The latest index continues in this vein: whatever criticism one can level at it, the IMD evidently takes forward attempts to quantify the geographical patterning of deprivation. However, its limitations, including those enumerated in this paper, mean that there continues to be considerable scope for future refinement.

Acknowledgements. The authors would like to express their gratitude to the Greater London Authority and the Association of London Government, sponsors of part of the research on which we draw for this paper, and to the Environmental Criminology Research Unit at the University of Liverpool, which also contributed to the research. Particular thanks are due to Margarethe Andersen who assembled the data on which much of the analysis presented in the paper is based.

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