



*Investigating the impact of
changing the weights that
underpin the Index of Multiple
Deprivation 2004*



*Investigating the impact of
changing the weights that
underpin the Index of
Multiple Deprivation 2004*

Dr. C. Dibben, Dr I. Atherton and Dr. M. Cox
(Geography and Geosciences, University of St Andrews)

Dr V. Watson, Prof. M. Ryan and Prof. M. Sutton
(Health Economics Research Unit, University of Aberdeen)

May 2007
Department for Communities and Local Government: London

The views expressed in this report are those of the consultant authors and do not necessarily represent the views or proposed policies of Communities and Local Government.

Department for Communities and Local Government
Eland House
Bressenden Place
London
SW1E 5DU
Telephone: 020 7944 4400
Website: www.communities.gov.uk

© *Crown Copyright, 2007*

Copyright in the typographical arrangement rests with the Crown.

This publication, excluding logos, may be reproduced free of charge in any format or medium for research, private study or for internal circulation within an organisation. This is subject to it being reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright and the title of the publication specified.

Any other use of the contents of this publication would require a copyright licence. Please apply for a Click-Use Licence for core material at www.opsi.gov.uk/click-use/system/online/pLogin.asp, or by writing to the Office of Public Sector Information, Information Policy Team, St Clements House, 2-16 Colegate, Norwich, NR3 1BQ. Fax: 01603 723000 or email: HMSOlicensing@cabinet-office.x.gsi.gov.uk

If you require this publication in an alternative format please email alternativeformats@communities.gsi.gov.uk

Communities and Local Government Publications
PO Box 236
Wetherby
West Yorkshire
LS23 7NB
Tel: 08701 226 236
Fax: 08701 226 237
Textphone: 08701 207 405
Email: communities@twoten.com
or online via the Communities and Local Government website: www.communities.gov.uk

May 2007

Product Code: 07NRAD0463(c)

CONTENTS

Introduction	5
The survey approach	7
Method	7
Results	9
Revealed preference approach	10
Method	10
Results	10
Discrete choice experiment (DCE)	12
Method	12
Results	14
Deriving empirical weights	16
Recommendation	16
Effect of recommendation	17
Conclusion	19
Annex A	20
Annex B	24
Annex C	31
Annex D	32
References	33

Introduction

The English Index of Multiple Deprivation (IMD) is a ‘compositional’ measure of area deprivation. It is based on the premise that multiple deprivation consists of individual components which can be measured separately but also combined to form an overall single measure. The latest version of the Index, produced in 2004, comprised seven separate components, which were termed ‘domains’ (Noble et al. 2004).

Because the IMD is a compositional measure, decisions have to be made as to the weight given to the various domains of the Index. The domain weights for the IMD 2000 and 2004 were determined principally on the basis of theory, with additional thought given to the robustness of the data. It was argued that the literature suggested that low income and dislocation from the labour market were key drivers of other deprivations, such as poor health outcomes and educational attainment, therefore these indicators should carry greater weight than other domains (see Table 1, Noble et al. 2004).

Table 1 Index of Multiple Deprivation 2004 domains and weighting	
IMD 2004 Domains	Weight
Income deprivation	22.5%
Employment deprivation	22.5%
Health deprivation and disability	13.5%
Education, skills and training deprivation	13.5%
Barriers to Housing and services	9.3%
Living environment deprivation	9.3%
Crime	9.3%

The weights used in 2004 have been supported in the consultations on the Index but the independent peer review identified a strong case for undertaking further research including sensitivity analysis (Bradshaw, 2003). The School of Geography and Geosciences at the University of St Andrews and the Health Economics Research Unit at the University of Aberdeen were commissioned to explore the potential for an empirically derived set of weights.

It was clear from the outset that there was no ‘direct’ empirical method for estimating the weights associated with the constituent domains of the IMD. Any attempt to model what best predicts multiple deprivation runs into the problem of circular reasoning. It is not possible, for example, to estimate a set of weights by modelling variation in the domains against the value of the IMD score because the IMD score cannot be derived without already knowing how to weight the separate domains. Instead three indirect methods were explored. Each captured slightly different but equally plausible questions about the relative ‘importance’ of the different domains.

1. *Survey approach* – How does living in the states measured by each domain affect an individual's chance of being social excluded?
2. *Revealed preference approach* – How does the state divide up the 'public purse' between different policies aimed at reducing the proportion of the population effected by each of the domains?
3. *Discrete Choice Experiment* – Given a choice between individuals living in these different states, who is felt to be most in need of support from the government?

The IMD method assumes that deprivation has an additive rather than multiplicative effect at the level of the individual. No adjustment is made for an 'extra' or 'lesser' impact for an individual experiencing more than one deprivation as appose to two individuals suffering just one form of deprivation. i.e.

Area A: with a population of 100, of whom 10 are experiencing both type 1 deprivation and type 2 deprivation.

Has the same multiple deprivation score, assuming equal weights, as:

Area B: with a population of 100, of whom 20 are experiencing only type 1 deprivation.

This meant that all three approaches assumed a purely additive relationship between domains. This meant that for the modeling approaches interactions terms were not used.

This report provides a summary of the methodology and the results derived using each of these approaches. From these results a set of recommended weights are derived and the effect of implementing these new weights considered.

The survey approach

The survey approach used an independent measure closely related to the concept of multiple deprivation to assess the importance of the various domains of the Index. It therefore avoids the problem of circular reasoning associated with trying to internally model a weight for the domains of the Index. The choice of the independent measure is informed by the work of Peter Townsend(1979), who contended that deprivation was the negative social and material state people in poverty cannot escape from and, by extension, hinders their ability to participate:

“in the activities and [do not] have the living conditions and amenities which are customary, or at least widely encouraged or approved in the societies to which they belong” (p. 31)

Thus an individual’s probability of feeling excluded from society is an important measure of the relative significance of different aspects of deprivation. In the survey approach we used the Millennium Poverty and Social Exclusion Survey (PSE) (Gordon et al. 2000) to examine the contributions of different domains to a social well-being measure closely related to social exclusion. This fits with Townsend’s conceptualisation of deprivation as not only a state but also a process that excludes people from social norms with consequences for the well-being of that person.

METHOD

The PSE is based on a sample of 1,534 individuals drawn from respondents to the 1998/99 General Household Survey, and interviewed in detail about their circumstances and their views on a range of issues associated with poverty, deprivation and social exclusion. One question from the PSE was particularly suitable:

“Have there been times in the past year when you’ve felt isolated and cut off from society or depressed, because of lack of money?”

The responses to this question were coded in such a way that a number of proxy measures for deprivation could be formulated: depending on whether the person reported that they felt isolated and cut off from society; or whether they felt depressed because of lack of money. However, it was decided that feelings of isolation and of being cut off from society best represented social exclusion and were therefore most suited to the purposes of this study. Although this definition was used in the study, other definitions were also tested and found to produce fairly similar findings. We are therefore confident the exact definition used is reasonably robust.

The responses to the ‘isolated’ question were used to derive a proxy variable for underlying deprivation based on individuals who felt socially excluded (see Table 2). This social exclusion variable was coded as a binary outcome where ‘no’=0 and ‘yes’=1. For modelling purposes: if a person was assigned 0 for the

variable they were regarded as not deprived; whereas if a person was assigned 1 they were regarded as deprived.

Table 2 The original question on the PSE from which the 'isolated' or 'social exclusion' variable is derived, the coding of responses, and number of observations		
PSE Question	Coding	Cases
Felt isolated and cut off from society in last year?	0=Other; 1=Isolated	0=1330; 1=240

In addition, for each domain of the IMD, response variables were selected from the PSE 1999 to best match the original indicator variables used in the domain (see Annex A for details of the indicators used). If exact equivalents were not available then variables that were of most relevance to the domain were used instead. Each PSE indicator was coded as a binary outcome. These variables were then combined to provide equivalent domain variables. If any of the constituent set of PSE indicators were coded as 1 then the domain variable was also coded as 1 (i.e. 'domain deprived'). Otherwise the domain variable was coded as 0 (i.e. 'not domain deprived'). The number of cases coded as deprived for each domain is displayed in Table 3.

Table 3 Number of deprived and non-deprived cases for each domain constructed from indicators taken from the PSE survey		
PSE Equivalent Domains	Domain Deprived Cases	Domain Non-Deprived Cases
Income	560	974
Employment	193	1341
Health	663	871
Education	379	1155
Barriers	60	1474
Environment	657	877
Crime	244	1290

A logistic regression model was then used to determine the relationship between each domain and the social exclusion measure. The model co-efficients for each domain provide a measure of the strength of the relationship between the domain and the deprivation proxy. By dividing each co-efficient by the sum of all the coefficients (the probability that an individual will feel socially excluded if they are deprived in terms of each of the domains of the Index), a new set of weights (scaled to sum to 1) can be calculated. This describes the relative importance of each domain for predicting underlying deprivation. These new weights can then be compared to the existing theoretical weights and to the weights produced by the other empirical methods employed in this study.

RESULTS

Table 4 shows the results of the logistic regression. Nearly all of the variables which represent the IMD deprivation domains were significant and all were positively related to feelings of social exclusion. Only the Barriers to Housing and Services domain was not significantly related to social exclusion. The weights derived from the coefficients in the survey are similar to existing theoretically derived IMD weights. The major difference is that the survey approach assigns greater importance to the Health Deprivation & Disability domain and less importance to the Employment domain.

Table 4 Logistic regression results for the survey approach		
Domain	Coefficient	Weight
Income	1.085**	21.60
Employment	0.873**	17.38
Health and disability	1.064**	21.18
Education skills and training	0.654**	13.02
Barriers to housing and services	0.290	5.78
Living and environmental	0.547**	10.89
Crime	0.510*	10.15

* Significant at the 95% level; ** Significant at the 99% level; Pseudo R2 = 0.1951
Number of Observations = 1534

Revealed preference approach

In the revealed preference approach, the proportion of government spending allocated to each domain of the IMD was used to derive a set of weights. This approach assumes that people's assessment of the relative importance of factors influencing their own lives, and those of their fellow citizens, is reflected in government spending. Political parties put different options before the electorate in terms of the manner and degree to which revenues are raised and how the state's resources will be spent. For example, since 1997 New Labour has emphasised the importance of education. This therefore provided a mandate to put their policies into action, with one result being a noticeable increase in the revenue directed into the education sector (Department for Education and Skills, 2004). This example illustrates how the political system allows the population to influence the direction of government policy and therefore the amount of resources directed towards each IMD domain. It can be seen to represent the value placed by society on keeping individuals out of a particular state of deprivation. This measure is therefore premised on the contention that the national debate on spending – acted out through the democratic process – is heavily influenced by a broad consideration of the importance of providing social goods to reduce need in specific areas of society, rather than a precise accounting process balancing the various costs of satisfying need in the different areas.

METHOD

Government spend is reviewed for the financial year 2003-2004, the most recent year for which actual rather than projected figures are published. Each of the major governmental departments has been assessed. We also include spending by local government where appropriate. The specific allocation of Departmental budgets to IMD domains is shown in Annex B.

We allot specific budgets to more than one domain where there are good theoretical reasons for doing so. Such an approach makes the assumption that voters recognise the multiple benefits of allocating spending to particular needs. For example, spending on schools can be conceived as addressing educational need, but it can also be seen as generating favourable conditions for future employment. Some spending is therefore included under more than one heading.

On the basis of these assembled spend figures, a set of potential weights were then calculated by comparing the proportion of the total government spend across all domains.

RESULTS

Table 5 summarises the total government spend attributed to each of the IMD domains. The percentage of spending indicates the degree of emphasis given by local and national government to each area. The percentage then translates to the weight that – using this particular approach – should be given to each domain.

Table 5 Summary of Government spend on each domain, 2003-2004		
Domain	Local and national government spending 2003-2004	
	(£millions)	Percent of all spending specific to a domain
Income deprivation	91,199	22.35
Employment deprivation	70,563	17.29
Health deprivation and disability	95,220	23.34
Education skills and training	47,592	11.66
Barriers to housing and services	41,278	10.12
Living and environmental deprivation	29,314	7.18
Crime	32,853	8.05
Total	408,019	100

Income Deprivation and Health and Disability Deprivation are given the greatest share of resources. Government spend suggests that the final three domains, namely Barriers to Housing and Services, Living and Environmental Deprivation, and Crime, are over-weighted by the theoretical approach.

Discrete choice experiment (DCE)

A DCE can also be used to assess the importance placed by the public on each deprivation domain. However, rather than using the lens of government spend, the public are addressed directly via a questionnaire based stated preference method. This method assumes that any state can be described by a set of attributes or dimensions. The relative importance of these dimensions is obtained by asking respondents to make choices between different states. This approach originated from market research and has been applied to transportation research and in environmental and health economics to elicit preferences for non-market goods (Louviere et al 2000). While the method has predominantly been used to value services, the application to the derivation of indices' weights is a promising new application.

METHOD

In our DCE, the state we are interested in is deprivation, and we have chosen to describe it using seven dimensions – each dimension is representative of one of the domains of the IMD. Each respondent to the questionnaires was asked to make a series of choices between two differing deprivation states. To ensure realism and respondent engagement the questionnaire refers to each state as a hypothetical person's circumstances. The respondents were then asked to choose which deprivation state they thought was worse and needs the most additional support from the government. By choosing between different pairs of deprivation states the respondent gives an indication of the relative importance they ascribe to each dimension (or domain) that can be statistically modelled and then used to derive a potential set of weights.

Establishing the dimensions and levels

The dimensions presented to respondents in the DCE were based closely on the seven domains of the IMD 2004. The corresponding levels were, where possible, based upon the indicators used for the domains in the IMD 2004. Whilst the choices presented to respondents were given in the context of a hypothetical person, the dimensions and their levels needed to be as realistic as possible to ensure task credibility. Therefore particular attention was paid to making sure the levels were as meaningful as possible for the respondents (see **Table 6**). Each deprivation dimension was expressed as two levels, one level indicating domain deprived (e.g. a household is income deprived if it has an income that corresponds to less than a £100 per person per week), and the other level being not domain deprived (e.g. a household income that corresponds to greater than or equal to £100 per person per week).

Table 6 Dimensions and levels in the discrete choice experiment		
Dimensions (Domains)	Levels	
	1	2
Income	At least £100 per adult per week.	Less than £100 per adult per week.
Employment	Not Unemployed – either employed, retired or looking after home/family.	Unemployed – not in paid employment.
Health	No limits on daily activity or work due to long term illness	Limits on daily activity or work due to long term illness.
Education	Have educational qualifications.	No educational qualifications.
Convenience of Core Services	Convenient services (within a short walk, drive, or bus ride).	Inconvenient services (not within a short walk, drive, or bus ride).
Housing Quality	Decent housing.	Non-decent housing.
Experience of Crime	Has not been a victim of burglary or theft in the past four years.	Has been a victim of burglary or theft in the past four years.

Creating the choice sets

In total there were a 128 (2^7) possible deprivation states (or ‘situation profiles’) as described by our seven dimensions. In each dimension of the profile, the hypothetical person, could be deprived or not deprived. In turn, each situation profile was paired with a partner profile to create a ‘choice set’. In the choice set, if a dimension of the original profile was described as deprived, then the corresponding dimension in the partner profile was described as not deprived (and vice versa). Therefore each choice set had an opposing state of deprivation in a process known as foldover. An example choice set is presented in figure 1. The 128 possible situations mentioned above result in 128 choice sets; too many to present to one respondent. Instead the 128 choice sets were randomly assigned to eight blocks, each block with 16 choice sets. Thus there were eight versions of the questionnaire each with a different block of 16 choice sets.

DCE instrument

A random sample of 1000 households in England was obtained using the Postcode Address File (PAF). The sample was randomly assigned to one of the eight questionnaire versions. Prior to the DCE questions each domain was described to respondents and the levels for that domain were presented. The choice task was explained to respondents and they were reminded there were no right or wrong answers. In addition to the DCE questions, the questionnaire collected socioeconomic characteristics of respondents. Questionnaires were sent in August 2006. One week later a postcard was sent to remind non-respondents to respond, and three later weeks a second questionnaire was sent to non-respondents.

Figure 1 Example Choice Set		
	Person A	Person B
Crime	Not a victim of crime in last 4 years	Victim of crime in last 4 years
Employment	Unemployed	Employed, retired or looking after home/family
Income	Less than £100 per adult.	At least £100 per adult.
Health	No limits on daily activity and work	Limits on daily activity and work
Housing Quality	Decent	Non decent
Education	No educational qualifications	Educational qualifications
Convenience of services	Inconvenient	Convenient
Who needs most support?	Person A	Person B

Estimating weights for the dimensions

From the questionnaire it can be observed if a respondent decides that person A or B should be given more support based on the dimension levels presented to them in the situation profile. Thus the choice results in a binary dependent variable, which equals 1 when A is chosen and zero when B is chosen. Using a probit model the probability that an individual will choose A based on the difference between the dimension levels presented in the choice can be estimated. From the model it is possible to calculate whether each dimension has a significant influence on the choice of deprivation state, and furthermore, how that dimension affects the probability that a particular state will be chosen.

A potential set of weights for the IMD is derived from the coefficients produced by the model. In essence the coefficients are an estimation of the impact of each dimension on the probability of a respondent stating a person should be given extra support. By dividing each coefficient by the combined total of all the coefficients (and multiplying by 100) we can calculate a proportional impact of each dimension on the decision to give extra support by the respondents, and thereby, produce a set of weights from the DCE.

RESULTS

In total, 251 respondents completed the DCE questionnaire¹. However the socio-economic characteristics of the respondents were not representative of the population of England (The socio-economic characteristics of the respondents is provided in Annex C). To correct for this, responses were weighted for both age and education, based on population proportions in the

¹ Of these 27 respondent did not complete the DCE, 2 respondents completed 1 choices, 2 respondents completed 3 choices, 1 respondents completed 4 choices, 2 respondents completed 6 choices, 3 respondents completed 7 choices, 1 respondent completed 11 choices, 4 respondents completed 12 choices, 3 respondents completed 14 choices, and seven respondents completed 15 choices.

census 2001. The results of the regression analysis for the unweighted and weighted samples are shown in Table 7 and Table 8 below.

Table 7 Probit regression results for the DCE (unweighted)		
Dimension	Marginal effect	Weight
Income	-0.207**	24.47
Employment	-0.021*	2.48
Health	-0.168 **	19.82
Education	-0.097 **	11.47
Convenience of Core services	-0.076 **	8.97
Housing Quality	-0.194 **	22.95
Experience of Crime	-0.083 (-8.61)**	9.84

* Significant at the 95% level; ** Significant at the 99% level; Pseudo R² = 0.2485
Number of Individuals = 251 Number of Observations = 3440

Table 8 Probit regression results for the DCE (weighted by age and education)		
Dimension	Marginal effect	Weight
Income	-0.186**	24.22
Employment	-0.013	1.73
Health	-0.159**	20.76
Education	-0.092**	12.01
Convenience of Core services	-0.069**	8.98
Housing Quality	-0.183**	23.79
Experience of Crime	-0.065**	8.49

** Significant at the 95% level; ** Significant at the 99% level; Pseudo R² =0.2203
Number of Individuals = 228 Number of Observations = 3393

In the tables, the significance level indicates whether a dimension has an impact on choices. Overall we can see that most dimensions are significant, either at the 95% or 99% confidence levels. The coefficient shows the probability of considering someone needs more support when moving from being deprived to not being deprived on the corresponding dimension. So, for example, in Table 8 being income deprived (living in a household with less than £100 per person per week) increases the probability of choosing a person to receive extra support by 0.186, everything else being equal. The weights based on these coefficients show that respondents felt people experiencing income, housing quality and health deprivation were most in need of extra support. In comparison to the original IMD weights this gives greater emphasis to health deprivation. Conversely, employment deprivation was given a much lower weighting by the respondents, than the 'traditional' IMD weighting.

Deriving empirical weights

The weights generated from the three methods are outlined in Table 9. All three methods produce similar weights and all were close to those used in the current Index. This suggested that there is a close match between what people feel is important, government spend and what appears to be significant for individuals actually experiencing deprivation.

Table 9 Weights generated by each of the methods and the recommended set of weights						
Domains of Deprivation	Survey Weights	Revealed Pref Weights	DCE Weights	Mean Weights	IMD 2004 Weights	Recommended Weights
Income	22	22	24	24	22.5	22.5
Employment	17	17	2	13	22.5	13.5
Health and disability	21	23	21	23	13.5	22.5
Education skills and training	13	12	12	13	13.5	13.5
Barriers to housing and services	6	10	9	9	9.3	9.3
Living and environmental	11	7	24	9*	9.3	9.3
Crime	10	8	9	9	9.3	9.3

* for this mean the value from the DCE was dropped

There were only two major discrepancies between the sets of weights produced by the different methods. The DCE derived domains weights for both the Employment (markedly lower) and Living & Environment (markedly higher) were quite different from the others. The higher weight on the living and environment domain may have resulted from framing the choice in terms of “decent housing” and the emotiveness of this subject. The very low weight on unemployment reflects respondents’ views that unemployment is not as significant a problem for individuals ‘over and above’ the other domains of the Index (i.e. that once you take into account poverty, then the ‘extra’ negative impact of unemployment will be slight). Although the other methods used to derive weights do not have employment as heavily weighted as the original IMD weights, they still suggest that employment has a substantial influence on deprivation, this, in the case of the survey approach, may relate to the social isolation experienced by people who are out of work.

RECOMMENDATION

No one method for weighting the domains of the IMD appears to stand out as stronger than the others, and because the results were very similar, our recommendation is to use the mean weight across all the methods as a guide to the appropriate weight for the Index. The only exception to this would be the DCE derived weights for the Living Environment domain. Here it is believed that the focus solely on housing – only one of the elements within the domain – has distorted the resulting weights and therefore this weight was not used in calculating the mean.

The two clear recommendations for change that come out of this empirical analysis of the IMD weights are that:

1. 'Employment' should be given less weight.
2. 'Health deprivation and disability' should be given more weight.

All the empirical methods have suggested that the employment domain should be given less weight. The DCE showed that if people's own opinions were to dominate, it would have a very low weight. This was balanced by the survey results that showed that, even after controlling for low income, unemployment still has a negative impact on social inclusion and the government spend data that demonstrates the importance that the State places on employment. All the weighting methods pointed towards the 'Health deprivation and disability' domain being given a higher weight.

Therefore it is recommended that for future productions of the IMD there is a simple swap of the present weights for these two domains ('Employment' and 'Health and disability') as this achieves a solution very close to that of the average weights across the three methods. It should be noted that this project did not look specifically at the robustness of data, which was a factor operationalised in the previous set of weights and therefore the recommended weights assume that the domains are all reasonably well measured.

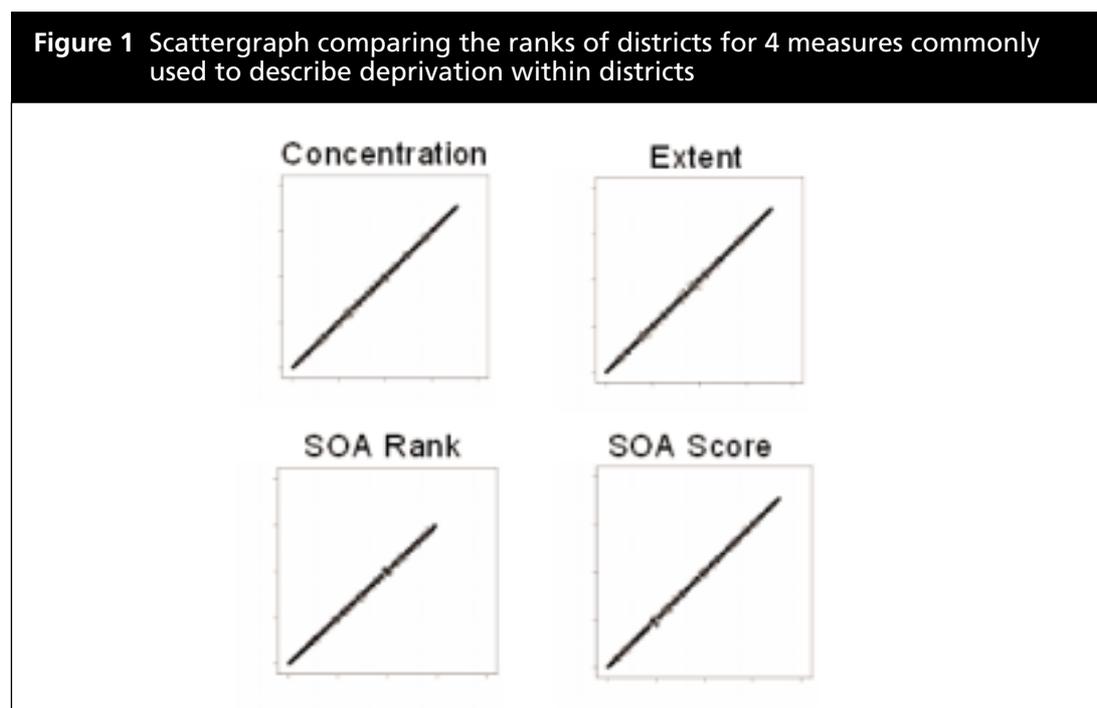
EFFECT OF RECOMMENDATION

Using different weights will alter the composition of districts that are deemed to have significant levels of deprivation. If Health and Disability Deprivation is given more emphasis, then a district with a population that has particularly severe health problems will be measured as more multiply deprived compared to one with fewer health problems but significant employment problems. However the effect of changing the weights may be small as there is a high degree of correlation between the different domains of the IMD. For example, areas with high unemployment are also likely to have higher proportions of their population suffering health problems. Therefore swapping the weights for the employment and health and disability domains may have less affect than one might suppose on the overall Index.

Several approaches are used in the IMD methodology to describe deprivation at the district level and help to decide which districts should receive additional funding. These summary measures include:

1. Local concentration
2. Extent
3. Numbers of income deprived
4. Numbers of employment deprived
5. Average Super Output Area (SOA) rank
6. Average SOA score

Figure 2 shows scattergraphs comparing rankings of districts using the original theoretically derived weights compared to the recommended weightings for each of these measures, using data from the IMD 2004. Note that only 4 of the 6 measures are included. The two scale measures – income and employment – use actual numbers of people and do not involve combination and therefore weights. They are therefore unaffected by any changes suggested by this report. The rankings for the remaining measures are closely correlated suggesting that there is relatively little movement in the rankings as a result of the suggested changes in weight.



Notes: the Y-axis shows rankings based on the weights used in the IMD in 2004 and the X-axis the recommended weights (low value = most deprived districts)

Similar scattergraphs were plotted for each of the three set of weights derived using the various empirical methods: survey approach; revealed preference approach; and DCE (see Annex D). All were highly correlated with the ranks produced by the original IMD 2004 weightings, with only the DCE showing any great variation in rank. This illustrates the IMD’s robustness to altering the weights.

Indeed the ranks of the most deprived areas were particularly stable which is especially important from a policy perspective. After applying the recommended weights to the IMD 2004, of the 80 districts with at least one summary score falling in the worst 50 districts across England, only one district fell out of that group and only one district moved in (see Table 10).

Table 10 Changes in the number of districts funded if the IMD 2004 had been weighted using the empirically derived weights from the different approaches – using the criteria of at least being in the worst 50 districts on any one of the district summary measures

Weights	Districts funded	Districts funded originally but not using new weight	Districts not funded using original weights but funded using new weights
Original IMD	80		
Survey	79	2	1
Revealed Preference	78	2	0
DCE	82	5	7
Recommended	80	1	1

Conclusion

On the evidence of the three empirical approaches used in this project, the aspects of deprivation which people think are important to tackle are closely aligned with where the government invests money and how people actually experience deprivation and social exclusion. In addition, after averaging these three approaches the weights produced are very similar to the theoretically derived weights previously used for the IMD 2004.

In general, the only domains that show a notable difference between the original weights and those derived in this report relate to Health deprivation and disability, which appear to have been previously designated too low a value, and Employment, that was over-weighted. Therefore, on the basis of the three different approaches that this report considered, it is suggested that the weight previously given to the Health and Disability Domain should be substituted with the Employment domain.

The association between the different domains of deprivation is such that changing weights in this way does not lead to a dramatic alteration of the overall IMD. Altering the weights will have relatively little effect on the position of districts with regard to previously used criteria for receipt of funding. Findings in this report thus indicate that the theoretically derived weights were reasonable but perhaps with this recommended slight change in the weights, the Index might better reflect people's experience and perceptions of the nature of multiple deprivation.

Annex A

Table A1 IMD 2004 indicators and their equivalent PSE indicators, with how they were coded, for each domain

IMD indicators	PSE equivalent indicators	PSE indicator coding
Income domain		
Adults and children in Working Families Tax Credit households whose equivalised income (excluding housing benefits) is below 60% of median before housing costs (2001, Source: Inland Revenue and DWP).	Low PSE equivalised net weekly household income.	0=Above 60% Median Equiv. Income; 1=Below 60% Median Equiv. Income
Adults and children in Income Support households (2001, Source: DWP).	Receipt of income supplement by HOH or spouse.	0=No income supplement; 1=Receives Income Supplement
Adults and children in Disabled Person's Tax Credit households whose equivalised income (excluding housing benefits) is below 60% of median before housing costs (2001, Source: Inland Revenue and DWP).	Receipt of NI sick pay, incapacity benefit by HOH or spouse.	0=No NI sick pay, incapacity benefit; 1=Received NI sick pay, incapacity benefit
Adults and children in Income Based Job Seekers Allowance households (2001, Source: DWP).	Receipt of job seekers allowance by HOH or spouse.	0=No Job Seekers Allowance; 1=Receives Job Seekers Allowance
National Asylum Support Service (NASS) supported asylum seekers in England in receipt of subsistence only and accommodation support (2002, Source: Home Office and NASS).	None available.	
Employment domain		
Unemployment claimant count (JUVOS) of women aged 18-59 and men aged 18-64 averaged over 4 quarters (2001, Source: ONS).	Respondent unemployed (ILO definition)	0=Other; 1=Unemployed (ILO definition)
Incapacity Benefit claimants women aged 18-59 and men aged 18-64 (2001, Source: DWP).	Respondent aged between 18 and retirement age and unable to work.	0=Other; 1=Unable to work.
Severe Disablement Allowance claimants women aged 18-59 and men aged 18-64 (2001, Source: DWP).	None available.	
Participants in New Deal for the 18-24s who are not included in the claimant count (2001, Source: DWP).	Respondent aged 18-24 on government scheme	0=Other; 1=On government scheme.
Participants in New Deal for 25+ who are not included in the claimant count (2001, Source: DWP).	Respondents aged 25+ on government scheme	0=Other; 1=On government scheme.
Participants in New Deal for Lone Parents aged 18 and over (2001, Source: DWP).	Respondent is lone parent aged 18+ on government scheme	0=Other; 1=On government scheme.

Table A1 IMD 2004 indicators and their equivalent PSE indicators

IMD indicators	PSE equivalent indicators	PSE indicator coding
Health domain		
Comparative Illness and Disability Ratio (CIDR) (2001, Source: IS, AA, DLA, SDA, IB from DWP).	Respondent's activities limited by illness or disability.	0=Activity not limited; 1=Activity limited.
Measure of adults under 60 suffering from mood or anxiety disorders, based on mood or anxiety disorders, based on prescribing (2001, Source: Prescribing Pricing Authority), Hospital Episode Statistics (1998/1999 to 2001/2002, Source: Department of Health), suicides (1997 to 2001, Source: ONS) and health benefits data (1999, Source: IB and SDA from DWP).	Mental health of respondent as measured by the GHQ12.	0=GHQ Score 0-3; 1=GHQ Score 4+
Measures of emergency admissions to hospital, derived from Hospital Episode Statistics (1999/2000 to 2001/2002, Source: Department of Health).	Respondent has attended casualty in last 3 months.	0=Not attended casualty; 1=Attended casualty.
Years of Potential Life Lost (YPLL) (1997 to 2001, Source: Mortality data from ONS).	None available.	
Education domain		
<i>Children/Young People sub-domain</i>		
Average points score of pupils at Key Stage 2 (end of primary) (2002, Source: Pupil Level Annual School Census (PLASC) and the National Pupil Database (NPD) from the DfES).	None available.	
Average points score of pupils at Key Stage 3 (2002, Source: Pupil Level Annual School Census (PLASC) and the National Pupil Database (NPD) from the DfES).	None available.	
Average points score of pupils at Key Stage 4 (GCSE/GNVQ – best of eight results) (2002, Source: Pupil Level Annual School Census (PLASC) and the National Pupil Database (NPD) from the DfES).	None available.	
Proportion of young people not staying on in school or non-advanced further education above 16 (Child Benefit 2001, Source: DWP).	None available.	
Secondary school absence rate (Average of 2001 and 2002, Source: DfES school level survey of authorised and unauthorised absences, allocated to the local area via the PLASC data, DfES).	None available.	
Proportion of those aged under 21 not entering Higher Education (1999-2002, Source: UCAS).	None available.	
<i>Skills sub-domain</i>		
Proportions of working age adults (aged 25-54) in the area with no or low qualifications (2001, Source: 2001 Census).	Respondent had no qualifications.	0=Qualifications; 1=No Qualifications

IMD indicators	PSE equivalent indicators	PSE indicator coding
Housing barriers & services domain		
<i>Wider barriers sub-domain</i>		
Household overcrowding (2001, Source: 2001 Census).	Household overcrowding.	0=Up to 1 person per room; 1=More than 1 person per room.
Difficulty of Access to owner-occupation (2002).	None available.	
LA level percentage of households for whom a decision on assistance under the homeless provisions of housing legislation has been made assigned to the constituent SOAs (2002, Source: ODPM).	None available.	
<i>Geographical barriers sub-domain</i>		
Road distance to GP premises (May 2003, Source: National Health Service Information Authority).	Respondent did not have use of doctor.	0=Other; 1=Don't use – unavailable or unsuitable.
Road distance to a Post Office (End of March 2003, Source: Post Office Ltd).	Respondent did not have use of a post office.	0=Other; 1=Don't use – unavailable or unsuitable.
Road distance to a supermarket or convenience store (December 2002, Source: MapInfo Ltd).	Respondent did not have use of a medium size supermarket.	0=Other; 1=Don't use – unavailable or unsuitable.
Road distance to a primary school (2001-02, Source: DfES).	None available.	
Environment domain		
<i>The 'indoors' living environment sub-domain</i>		
Social and private housing in poor condition (2001, Source: BRE and ODPM, modelled EHCS).	Accommodation was in poor state of repair.	0=Good/adequate state of repair; 1=Poor state of repair.
Houses without central heating (2001, Source: 2001 Census).	Accommodation without central heating.	0=Central heating; 1=No central heating.
<i>The 'outdoors' living environment sub-domain</i>		
Road traffic accidents involving injury to pedestrians and cyclists (2000-2002, Source: DfT, STATS19 (Road Accident Data) smoothed to SOA level).	Respondent reported road risk as problem in area.	0=Road risk not problem; 1=Road risk is a problem.
Air quality (2001, Source: UK National Air Quality Archive data modelled at SOA level by the Geography Department at Staffordshire University).	Respondent reported air pollution as problem in area.	0=Air pollution not problem; 1=Air pollution is problem

Table A1 IMD 2004 indicators and their equivalent PSE indicators

IMD indicators	PSE equivalent indicators	PSE indicator coding
Crime domain		
Burglary (4 recorded crime offence types, Police Force data for April 2002-March 2003, constrained to Crime and Disorder Reduction Partnership (CDRP) level).	Actual or attempted break in to home in the last year.	0=No attempted break-in; 1=Attempted break in.
Criminal damage (10 recorded crime offence types, Police Force data for April 2002-March 2003, constrained to CDRP level).	Deliberate damage or vandalism to home in the last year.	0=No vandalism to home; 1=Vandalism to home.
Theft (5 recorded crime offence types, Police Force data for April 2002-March 2003, constrained to CDRP level).	Theft of item being carried in the last year.	0=Nothing stolen; 1=Something stolen.
Violence (14 recorded crime offence types, Police Force data for April 2002-March 2003, constrained to CDRP level).	Violently assaulted outside of household or by adult member of household.	0=No violence towards them; 1=Violent towards them

Annex B

Government spend by each domain

INCOME DEPRIVATION

Government department's spending was assessed for the degree to which it was primarily aimed at alleviating income poverty. The results are shown in Table B1, with figures from the Department of Work and Pensions (DWP) and HM Revenue and Customs being allocated to the particular domain. Some benefits are intended primarily to assist people into or remain within work, childcare element of the working tax credits, which enable parents to afford nursery costs and thus remain in the labour market. These benefits are not included in the Income Deprivation domain given their primary rationale, and instead they are included in the employment deprivation domain. Means tested benefits are in the main aimed at ensuring people have a minimum level of income, for example income support, and thus these are included here.

Table B1 Income deprivation		
Expenditure	Spending (£million)	
Department of work and pensions¹	Resource spending	Capital spending
Children	249	8,287
Working-age (minus employment related benefits)	18,135	
Pensioners	55,549	#
Corporate and shared services	1,679	91
National Insurance Fund	1,423	1
Public corporations	115	-65
Total spending by Department of Work and Pensions on Income Deprivation	85,529	
HM Revenue and customs (2005)²		
Tax credits	5,670	
Total government expenditure on income deprivation	91,199	

1 see Department of Work and Pensions ((2005)) Table 2.

2 see HM Revenue and Customs ((2005)) Table 1.

EMPLOYMENT DEPRIVATION

Table B2 shows government spending primarily aimed at relieving employment deprivation. We include spending on education in this domain; it is also included as part of Education, Skills and Training. A primary function of

spending on schools and training programmes is not only to develop rounded citizens, but also to ensure a workforce capable of meeting the needs of a modern and dynamic economy. Hence there is a convincing rationale for inclusion of the education budget in the Employment Domain.

We include those benefits designed to assist people to remain a part of the labour force, or to take a break from participation in waged labour. Frictional unemployment is an important part of a dynamic and flexible economy, so that people may move out of participation for a period before rejoining, potentially in a different sector. It will therefore be noted from Table B2. that we include in this domain spending on income transfers such as employment benefit, statutory maternity pay, and so forth.

Table B2 Employment Deprivation		
Expenditure	Total (£million)	
Department of Work and Pensions		
Employment programmes ¹	1,403	
Working age employment benefits (including jobseeker's allowance, job grant, earnings top up, statutory sick pay, statutory maternity pay, maternity allowance, and incapacity benefit) ¹	15,887	
Total DWP spending on Employment Deprivation	17,290	
Department of Trade and Industry²	Consumption of resources	Total capital budget
Increasing UK competitiveness	2,859	510
Increasing Scientific Excellence	2,196	116
Total spending by Department of Trade and Industry on Employment Deprivation	5,681	
Department of Education and Skills (see Table B4)	47,592	
Total Government spending on Employment Deprivation	70,563	

1 See Department of Work and Pensions ((2005)) Table 2.

2 See Department of Trade and Industry ((2005)) Table 1.

HEALTH AND DISABILITY DEPRIVATION

Allocation of spending on resources primarily intended to address Health and Disability Deprivation is shown in Table B3. We have included not only spending directly on the National Health Service in this domain, but also resources allocated by councils on social service provision; an essential part of the lives of many who have a disability. Additionally, those income transfers that are not means tested and enable people to act as carers, thus enabling individuals to remain living independently in the community, are also added to the total.

Table B3 Health and Disability Deprivation				
Department of Health expenditure¹				
Current expenditure	Hospital community & family health (discretionary) services and related services and trusts	Family Health services (non discretionary)	Central health and miscellaneous services (including departmental admin)	NHS Total
Gross	59,799	3,029	1,477	64,305
Charges & receipts	-2,204	-932	-141	-3,278
Net	57,594	2,097	1,336	61,027
Capital expenditure				
Gross	2,856	0	60	2,917
Charges & receipts	-277	0	0	-277
Net	2,579	0	60	2,640
Total				
Gross	62,655	3,029	1,538	67,221
Charges & receipts	-2,481	-932	-141	-3,555
Net	60,173	2,097	1,397	63,667
Spending by Department of Work and Pensions (2005)²				
Disability	19,190		249	
Total	19,349			
Spending by councils on social service care provision³				
Social services strategy		85		
Older people (aged 65 and over) including older mentally ill		4,043		
Adults aged under 65 with physical disability or sensory impairment		5,802		
Adults aged under 65 with learning disabilities		1,066		
Adults aged under 65 with mental health needs		882		
Other adult social services		326		
Total		12,204		
Total spending on health deprivation and disability		95,220		

1 See Department of Health (2006) Table E1

2 See Department of Work and Pensions (2005) Table 1

3 See Department for Communities and Local Government (2005) Table C1c

EDUCATION SKILLS AND TRAINING DEPRIVATION

We include spending of the Department of Education and Skills to ascertain the priority government gives to the Education, skills and training deprivation domain, as is shown in Table B4.

Table B4 Education, Skills and Training Deprivation	
Department for Education and Skills¹	2003-2004 estimated outturn
Schools	
Capital	2,628
Current	29,763
<i>of which</i>	
Under 5s	3,436
Primary	10,031
Secondary	12,594
Other	3,701
Further education, adult learning and other education initiatives	5,671
Higher Education	5,589
Student support	1,058
<i>of which</i>	
Further education	159
Higher education	900
Administration, inspection costs and miscellaneous services	1,592
Total	
Real terms	46,301
Cash	47,592
Total spending on education skills and training	47,592

¹ See Department for Education and Skills (2004) Table 2.3

BARRIERS TO HOUSING AND SERVICES DEPRIVATION

Table B5 shows spending that has the primary goal of overcoming barriers to housing and services deprivation. The domain includes factors such as household overcrowding, homelessness and the difficulty of entering owner-occupation. It also involves transport in that it reflects distances to services. Hence, we include resource allocation of the Office of the Deputy Prime Minister that is apportioned with the intention of addressing substandard housing. Funding for transport, both by the Department of Transport as well as local councils are also added to the total.

Table B5 Barriers to Housing and Services Deprivation		
Spending by ODPM¹		
Consumption of resources	2003-2004 outturn	
Housing supply and demand	2,103	
Decent places to live	351	
Tackling disadvantage	2,205	
Better services	70	
Capital spending		
Housing supply and demand	388	
Decent places to live	1,260	
Tackling disadvantage	221	
Better services	109	
Total	6,707	
Local council spending		
Total non-HRA housing services ²	9,103	
Highways, roads and transport services (specifically: highways maintenance planning, policy and strategy; public and other transport planning policy and strategy; structural maintenance-local authority roads; winter maintenance; street lighting; congestion charging; safe routes; road safety education; parking services; concessionary fares; bus services; local rail services; other public transport) ³	4,681	
Department of transport spending⁴		
	Consumption of resources	Capital spending
PSA Objective 1 – Support the economy through the provision of efficient and reliable inter-regional transport systems by making better use of the existing road network; reforming rail services and industry structures to deliver significant performance improvements	8,372	427
PSA Objective 2 – Deliver improvements to accessibility punctuality and reliability of local and regional transport systems through the approaches set out in Objective 1 and through the increased use of public transport and other appropriate local solutions	2,049	2,522
PSA Objective 3 – Balance the need to travel with the need to improve quality of life by improving safety and respecting the environment	372	68
PSA Objective 4 – Improve cost effectiveness through sound financial management, robust cost control and clear appraisal of transport investment choices across modes and locations	125	16
Spending by Local Authorities relevant to Department of Transport	4,392	2,444
Total	20,787	
Total spending on barriers to housing and services	41,278	

1 See ODPM (2005) Table B1

2 See Department for Communities and Local Government (2005) Table C1d

3 See Department for Communities and Local Government (2005) Table C1b

4 See Department of Transport (2005) Table A1

LIVING AND ENVIRONMENTAL DEPRIVATION

The Living Environment Deprivation domain consists of aspects both pertaining to the outdoor and indoor environment. Hence resources that are spent on

housing are included here, as shown in Table B6, including funds from the then Office of the Deputy Prime Minister, and those benefits provided by the Department of Work and Pensions that have the aim of assisting people to live in adequate accommodation. The funds that government uses towards the external are represented here by the budget items of the Department for Environment, Food and Rural Affairs that are primarily allocated with the intention of maintaining or improving the outdoors environment. Additionally, those aspects of spending by local councils that also contribute to these aims are also incorporated to the total spend.

Table B6 Living and Environmental Deprivation		
	Consumption of resources	Capital spending
Spending by DEFRA¹		
Environmental protection	618	403
Natural resources and rural affairs	426	45
Departmental operations	309	20
Rural payments agency	590	36
Total spending	2,447	
Spending by ODPM²		
Housing supply and demand	2,104	388
Decent places to live	351	1,260
Tackling disadvantage	2,205	221
Better services	70	109
Development of English regions	1,015	524
Admin	182	11
Government office administration	134	2
Total spending	8,576	
Spending by local councils relevant to domain 6³		
Environmental services (Foreshore; sports and recreation facilities, including golf courses; open spaces; cemetery, cremation and mortuary services; public conveniences; other environmental health; specifically: defences against flooding; internal drainage levy work; coast protection; street cleansing (not chargeable to highways); waste collection; waste disposal; building control; development control; conservation and listed buildings planning policy; other planning policy; environmental initiatives)	5,375	
Spending by Department of Work and Pensions on Housing Benefits⁴	12,916	
Total spending on Living and Environmental deprivation	29,314	

1 See DEFRA (2006) table 1

2 See ODPM (2005) table B1

3 See Department for Communities and Local Government (2005) table C1e

4 See Hansard (2005)

CRIME DEPRIVATION

Table B7 shows the spending of the Home Office that is allocated to achieve strategic objectives that fit within the definition of the crime domain. Some spending by local councils is also primarily allocated to address crime, and we thus include this spending in the total.

Table B7 Crime Deprivation		
	2003-2004 outturn	
Home Office Spending¹		
Strategic objective	Consumption of resources	Capital spending
People are and feel more secure in their homes and daily lives (includes police, crime reduction, criminal records bureau, firearms compensation, police information technology, police complaints authority, independent police complaints commission, central police training and development agency, organised crime and counter terrorism, national criminal intelligence service, and national crime squad)	5,703	545
More offenders are caught, punished and stop offending, and victims are better supported (includes correctional services, youth justice board, probation, prison service, criminal cases review commission, criminal injuries compensation authority, and criminal justice)	3,754	257
Fewer people's lives are ruined by drugs and alcohol	96	0
Migration is managed to the benefit of the UK while preventing abuse of the immigration laws and of the asylum system (includes office of the immigration service commissioner, immigration and nationality directorate, and UK passport service)	1,875	123
Citizens, communities and the voluntary sector are more fully engaged in tackling social problems and there is more equality of opportunity and respect for people of all races and religions (includes community development foundation, commission for racial equality, community policy directorate, and futurebuilders)	87	0
Central services (includes central services, research and statistics directorate, and departmental unallocated provision)	209	2
Total spending by Home Office on Domain 6 objectives	23,309	
Spending by local councils applicable to crime		
Police services	9,498	
Coroners court services	46	
Magistrates and other court services	445	
Total spending on crime	32,853	

¹ See Home Office (2005) Table 6.1

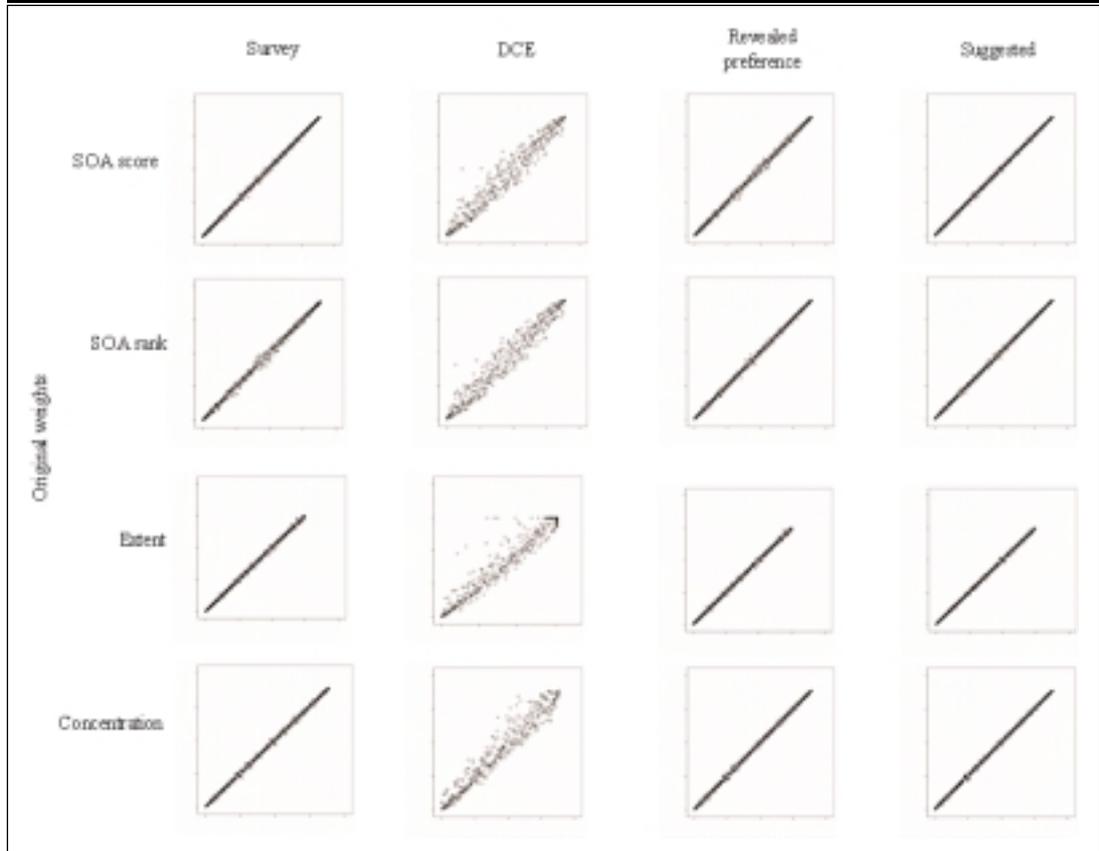
² See Department for Communities and Local Government (2005) Table C1f

Annex C

Table C1 Socioeconomic characteristics of DCE respondents		
Socioeconomic Characteristics	Level	Sample (%)
Age	Range	18-91
	Mean	54
	Median	54
	Mode	59
Gender	Male	49.3
	Female	50.7
Education	None	20.6
	O level	14.8
	A level	12.1
	Apprentice	17.5
	Degree	27.4
	Other	7.6
Employment	Employed	47.5
	Seeking Employment	1.81
	Retired	34.84
	Looking after Home/family	2.71
	Ill health	2.71
	Student	0.90
	Self employed	9.05
Income	0	0
	Up to 5200	4.3
	5,200 – 10, 399	13.3
	10,400 – 15,559	11.4
	15,600 – 20,799	4.8
	20,800 – 25,999	13.8
	26,000 – 31,199	12.9
	31,200 – 51,999	22.4
	52,000 +	17.1

Annex D

Figure D1 Scattergraphs comparing the IMD 2004 ranks of districts for 4 measures commonly used to describe deprivation when using the weights suggested by each approach with the original IMD weights (low values – most deprived districts).



References

DEFRA. 2006. Departmental Report 2006 (DEFRA, ed). Norwich: Norwich: HMSO.

Department for Communities and Local Government. 2005. Local Government Financial Statistics England No.16 2005 (Government DfCaL, ed).

Department for Education and Skills. 2004. Departmental Report 2004 (Skills DfEa, ed): Norwich: HMSO.

Department for Transport. 2005. Annual Report 2005 (Transport Df, ed): Norwich: HMSO.

Department of Health. 2006. Health and social services statistics, England (Health Do, ed):Government Statistical Service.

Department of Trade and Industry. 2005. Department Report (Industry DoTa, ed): Norwich: HMSO.

Department of Work and Pensions. 2005. The DWP Departmental Report (Pensions DoWa, ed): Department of Work and Pensions.

Department of Work and Pensions. 2005. The DWP Departmental Report: The Department for work and pensions
<http://www.dwp.gov.uk/publications/dwp/2005/dr05/foreword.asp> (last accessed 20 September 2006).

Gordon D, Adelman L, Ashworth K, Bradshaw J, Levitas R, Middleton S, et al. 2000. Poverty and Social Exclusion in Britain. York: Josphe Rowntree Foundation.

Hansard. 2005. House of Commons Written Answers for 27 June 2005:
<http://www.publications.parliament.uk/pa/cm200506/cmhansrd/cm050627/text/50627w20.htm>.

HM Revenue & Customs. 2005. Child and Working Tax Credits Statistics: finalised awards 2004-04 (Customs HR, ed): National Statistics.

Home Office. 2005. Departmental Report (Office H, ed): Norwich: HMSO.

Louviere JJ, Hensher DA, Swait JD. 2000. Stated Choice Methods: Analysis and Application. Cambridge: Cambridge University Press.

Noble M, Wright G, Dibben C, Smith GAN, McLennan D, Anttila C, et al. 2004. Indices of Deprivation 2004: ODPM.

ODPM. 2005. Annual Report. Norwich: Office of the Deputy Prime Minister,
http://www.communities.gov.uk/pub/48/2005ODPMAnnualReportPDF1175Kb_id1123048.pdf (last accessed 12 October 2006).

Townsend P. 1979. Poverty in the United Kingdom. London:Penguin.