ANNEX 1

MEASURING DEPRIVATION

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Introduction

There are a variety of deprivation indices currently in existence, which were developed to meet different objectives. There has been much discussion on their relative merits, but a clear consensus regarding the best selection of indicators or methods of construction has yet to be achieved. This paper begins by discussing the general concept of deprivation...
indices. It then presents brief summaries of the common measures and highlights some of the discussion that has surrounded their use.

**Deprivation Indices**

In general, deprivation indices “measure the proportion of households in a defined small geographical unit with a combination of circumstances indicating low living standards or a high need for services, or both”. 1 An important note to be made about all ecological measures of deprivation (i.e. measures based on geographic areas, rather than individual circumstances) is that “not all deprived people live in deprived wards, just as not everybody in a ward ranked as deprived are themselves deprived”. 2 This point is reiterated by Sloggett and Joshi 3 who note “deprivation indices may be gainfully used to identify areas of relative concentration of disadvantage, in the absence of data at the personal level, or where the fact of geographic concentration is pertinent…but disadvantaged people also live elsewhere and could be excluded in large numbers if interventions were planned purely on the basis of a local, census based, deprivation score”. They go on to note that “for maximum effectiveness, health policy needs to target people as well as places”.

In interpreting deprivation scores it is important to remember that many deprivation scores are relative measures, i.e. the score for any one area is standardised by reference to the mean for the total of all areas included in the calculation. For example, scores derived for all the wards in one Local Authority (LA) cannot be compared to scores derived separately for all the wards in another LA, because the scores for each set of wards are relative to the mean for the respective LA.

**Measures Of Deprivation In Common Use**

There are many different measures of deprivation that are in common use. In the past, the most commonly used have been the Jarman Underprivileged Area Score, the Townsend Index, The Carstairs Index and the Department of the Environment’s (DoE) Index of Local Conditions. More recently, the Indices of Deprivation 2000 (ID2000) published by the Department of Environment, Transport and the Regions (DETR) and its 2004 revision (ID2004) published by Office of the Deputy Prime Minister (ODPM), have come into widespread use.

In a study comparing how the use of different measures of deprivation may influence resource allocation decisions Mackenzie et al. 4 highlighted that different organisations have preferences for different measures. For example, they state that the Townsend Material Deprivation Score is favoured by Health Authorities (HAs), whereas LAs have tended to use the DETR’s ID2000. The DoE’s Index of Local Conditions is also well used. The Jarman Underprivileged Area Score is used by DH for making additional payments to General Practitioners (GPs). A less widely used index, The Breadline Britain Score, has been used by the media to estimate the percentage of poor households in a particular area.

The Townsend Index and the Carstairs Index (which is a very similar measure developed specifically for the analysis of Scottish health data) were both developed as measures of material deprivation. They tend to be commonly used in epidemiological analyses, e.g. the publication by the Office for National Statistics (ONS) on Trends in Cancer Survival. 5 The Jarman Underprivileged Area Score was not originally constructed to measure deprivation but as a measure of General Practice workload. The Jarman Score was derived to take account of geographic variations in the demand for primary care based on a survey of GPs’ subjective impressions of the social factors among their patients that most affected their workload.

The series of indices that have been produced by the DoE and its successors the DETR and ODPM, were designed as general measures to identify areas of greatest need in order to assist central government when allocating resources to LAs. The latest ID2004 published by ODPM in April 2004 are the most up to date and detailed analyses of deprivation in England ever produced. The Indices combine a number of indicators, chosen to cover a range of economic, social and housing issues for each of approximately 32,000 Super Output Areas (SOAs). The new indices replace the previous indices: ID2000, the 1998 Index of Local Deprivation and the 1991 Index of Local Conditions.

**The Department Of The Environment’s Index Of Local Conditions (1991)**

– superseded by later DETR Indices of Deprivation

In 1995, the DoE commissioned a team of researchers to produce an “Index of Local Conditions”. 6, 7 This was to provide a general index of urban deprivation in order to inform policy and planning initiatives. The main purpose of the index was to identify those areas that experience the greatest levels of multiple deprivation so that regeneration programmes could be targeted.

The Index of Local Conditions comprises 13 variables, seven Census variables and six non-Census variables (all 1991 except where stated):

**Census variables:**
- Unemployment;
- Children in low-earner households;
- Overcrowding;
The Index of Local Conditions is an unweighted summation of the selected indicators using their log-transformed signed chi-square values. The standardisation and transformation "has the merits of: taking account of the small size of the denominators of many of the observations; using an interpretable value of zero; and using values which approximate the normal curve". The actual number of persons which have each selected variable is compared to the number that is expected if average English rates applied. The difference between the actual and expected numbers is squared and then divided by the expected number. The value 1 is added and a log transformation then applied. Those scores where the actual rate is below the expected rate are given negative signs. Summed scores greater than zero indicate greater levels of material deprivation.

This index differs from most in using actual numbers rather than percentage rates as the input into the calculations. This has the effect of giving lower weights to those areas where the actual counts are small and hence statistically less reliable (e.g. an area where 3 out of 10 persons are unemployed will have a lower score than one where unemployment is 30 out of 100).

The Department Of The Environment, Transport And The Regions’ Index Of Local Deprivation (1998) - superseded by the Indices of Deprivation 2000

In June 1998, following consultation, the DETR published an updated version of the 1991 Index of Local Conditions. The 1998 Index of Local Deprivation, based mainly on data for 1996, was calculated for all 354 LAs as constituted as at April 1998. The ward and enumeration district (ED) level indices are based on the 1991 Census Area definitions. There are 12 indicators in the district level index relating to different dimensions of deprivation – income, health, education, environment, crime, and housing.

The indicators are:

- Unemployment (1997);
- Dependent children of income support recipients (1996);
- Overcrowding (1991 Census);
- Housing lacking basic amenities (1991 Census);
- Non-income support recipients in receipt of council tax benefit (1996);
- Educational participation (1991 Census);
- Long-term unemployment (1997);
- Income support (1996);
- Low educational attainment (1996);
- Standardised mortality ratios (1996);
- Derelict land (1993);

There are two main differences in the method between the 1991 Index of Local Conditions and 1998 Index of Local Deprivation. Firstly, in the 1991 index the values for the indicators are simply added together to produce the overall index score, whereas in the 1998 index only the positive values (those where the actual count exceeded that expected) are summed. Secondly, in the 1991 index no weightings are attached to any of the indicators. In the 1998 index the values for the standardised mortality ratio and insurance premium indicators are multiplied by two to give them a similar level of influence in the overall index.

The Department Of The Environment, Transport And The Regions’ Indices Of Deprivation 2000 - superseded by the Indices of Deprivation 2004

In December 1998, the DETR commissioned the Social Disadvantage Research Centre at the University of Oxford to review and update the 1998 Index of Local Deprivation. There were criticisms of the 1998 Index of Local Deprivation and the 1991 Index of Local Conditions that it updated: the sub-district level indicators were out of date, and the chi-squared
method needed to be reviewed (see above). Also, better small area data at the sub-district level were about to come on stream for the first time.

In August 2000, following extensive consultation, DETR published the Indices of Deprivation 2000 (ID 2000). This set of indices is more complex than all of the other commonly used indices.

The ID 2000 is made up of:

- Six Domain Indices at ward level (Income, Employment, Health Deprivation and Disability, Education Skills and Training, Housing and Geographical Access to Services);
- An overall ward level Index of Multiple Deprivation 2000 (IMD 2000);
- A supplementary ward level Child Poverty Index;
- Six summary measures of the overall IMD 2000 at the LA level.

The new IMD 2000 is an innovative and detailed ward level index with LA level presentations. It is based on six separate “domains” of deprivation. These are:

- Income (25%);
- Employment (25%);
- Health Deprivation and Disability (15%);
- Education, Skills and Training (15%);
- Housing (10%);
- Geographical Access to Services (10%).

A Child Poverty Index is also available. This was constructed by combining the indicators within the income domain, for children aged under 16 only.

These domains each contain information essential to LAs (and others) who wish to describe their area and the overall nation-wide picture. The ID 2000 uses mostly 1998 information from 33 indicators to describe deprivation at ward level. This includes information from previously untapped data sources, such as Department of Social Security (DSS) benefits data and University and Colleges Admissions Service (UCAS) data. Most of the indicators can be updated regularly and form the basis for a dynamic Index. In addition to the Domain Indices, the overall ward level IMD brings this substantial amount of knowledge and information together for the first time.

Drawing together these indicators gives the IMD 2000 a major advantage over previous indices. The range of indicators at ward level enables a focus on deprivation at a small geographical level that was not possible before. This is an improvement on the 1998 Index of Local Deprivation which was able to present very little information at ward level. The information that was included was based on the 1991 Census and, therefore, was increasingly out of date.

The information from the IMD 2000 has been aggregated up to the LA level in six different ways, allowing LAs to be ranked according to how deprived they are relative to other districts. All of the six measures are equally valid and they should not be used in isolation from each other. They are:

- Average Score - the population weighted average of the combined scores for the wards in an LA;
- Average Rank - the population weighted average of the combined ranks for the wards in an LA;
- Local concentration - the population weighted average of the ranks of an LA’s most deprived wards that contain exactly 10% of the LA’s population;
- Extent - the proportion of an LA’s population living in wards which rank within the most deprived 10% of wards in England;
- Income Scale - the number of people in an LA who are income deprived;
- Employment Scale - the number of people in an LA who are employment deprived.

Patterns of deprivation are complex: in some places the entire LA may be generally deprived, but with no very severe areas. Elsewhere, deprivation may be concentrated in very severe pockets that co-exist alongside generally affluent areas. The six measures are attempts to reflect these different patterns. As all the rankings are based on the same data, there is no one measure that can be used as an overall ranking. Some Authorities may be ranked poorly on some measures, but less so on others.

The data and further details about the ID 2000 can be found on the ODPM’s website at: http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=4603&l=3
Indices Of Deprivation 2000 For Health Authorities And Primary Care Groups
- superseded by the Indices of Deprivation 2004

The DH commissioned the Social Disadvantage Research Centre at the University of Oxford to produce the ID 2000 for HAs and Primary Care Groups (PCGs). These were received in May 2001 and are based on the boundaries as at 1st April 1999. At that time there were 99 HAs and 481 PCGs.

For both HAs and PCGs, the six summary measures of the IMD 2000 are presented in a similar fashion to that used for LAs. In addition the average score, average rank, concentration, and extents measures are also presented separately for each of the 6 deprivation domains. For each index, the HAs and PCGs are awarded both a score and a rank position.

The Office Of The Deputy Prime Minister's Indices Of Deprivation 2004

The ODPM commissioned the Social Disadvantage Research Centre at the Department of Social Policy and Social Research at the University of Oxford to update the ID 2000. Following two extensive public consultations, and an academic peer review, the new ID 2004 were produced in 2004. The new indices are based on the approach, structure, and methodology that were used to create the ID 2000, but have been updated in two key ways: first, more up-to-date data have been used; and second, new measures have been incorporated as new and improved data sources have become available. The new ID 2004 includes 37 indicators within seven deprivation domains. The criteria for inclusion of these indicators were that they should be “domain specific” and appropriate for the purpose (i.e. they should measure that form of deprivation as directly as possible); measure major features of that deprivation (not conditions just experienced by a very small number of people or areas); up-to-date; capable of being updated on a regular basis; statistically robust; and available for the whole of England at a small area level in a consistent form. Where possible, the indicators relate to the year 2001. The seven domains are:

- Income (22.5%);
- Employment (22.5%);
- Health and disability (13.5%);
- Education, skills and training (13.5%);
  - Children and young people,
  - Skills;
- Barriers to Housing and Services (9.3%);
  - Wider Barriers,
  - Geographical barriers;
- Living environment (9.3%);
  - Indoors living environment;
  - Outdoors living environment;
- Crime (9.3%).

These domains are combined in the overall measure of multiple deprivation, the IMD 2004. The model of multiple deprivation which underpins the IMD 2004 is based on the idea of distinct dimensions of deprivation that can be recognised and measured separately. These are experienced by individuals living in an area. People may be counted in one or more of the domains, depending on the number of types of deprivation that they experience. The overall IMD is conceptualised as a weighted area level aggregation of these specific dimensions of deprivation.

A further change from the ID 2000 is that the indices are calculated at a lower geographical level. The indices are presented for 32,482 SOAs in England rather than the 8,414 wards used previously. Each of the SOAs has been assigned a score and rank for the IMD 2004; the seven separate domain indices; the sub-domains; and two supplementary indices: Income Deprivation Affecting Children, and Income Deprivation Affecting Older People.

Aggregations of the IMD 2004 to LA level have been made in the same way as for the IMD 2000, i.e. using six summary measures reflecting different patterns of deprivation. These are:

- Average of SOA Ranks - the population weighted average of the combined ranks for the SOAs in an LA;
- Average of SOA Scores - the population weighted average of the combined scores for the SOAs in an LA;
- Local Concentration - the population weighted average of the ranks of an LA's most deprived SOAs that contain exactly 10% of the LA's population;
- Extent - the proportion of an LA's population living in SOAs which rank within the most deprived 10% of SOAs in England;
• Income Scale - the number of people who are income deprived;
• Employment Scale - the number of people who are employment deprived.

County level summaries of the IMD 2004 have also been produced. At this point in time, IMD 2004 summary measures are not available for PCOs.

The data and further details about the ID 2004 can be found on the ODPM's website at: http://www.odpm.gov.uk/stellent/groups/odpm_control/documents/contentservertemplate/odpm_index.hcst?n=4610&l=3

Jarman Underprivileged Area Score

The Jarman Underprivileged Area (UPA) Score\(^{11,12}\) was not originally constructed to measure deprivation but as a measure of General Practice workload. The index was derived to take account of geographic variations in the demand for primary care based on a survey of GPs’ subjective impressions of which of their patients’ social factors most affected the Practice workload. The variant of the score in most common use – the UPA8 score – comprises eight variables which were individually weighted by a sample of London GPs.\(^{13}\) These are given along with their respective weights below:

• Unemployment (3.34) - unemployed residents aged 16+ as a proportion of all economically active residents aged 16+;
• Overcrowding (2.88) - residents in overcrowded households (more than one person per room) as a proportion of all residents in households;
• Lone parents (3.01) - residents in “lone parent” households as a proportion of all residents in households;
• Under 5s (4.64) - residents aged under 5 years as a proportion of all residents;
• Elderly living alone (6.62) - elderly persons living alone as a proportion of all residents in households;
• Ethnicity (2.50) - residents born in the New Commonwealth or Pakistan as a proportion of all residents;
• Low social class (3.74) - persons in households with economically active head of household in socio-economic group 11 (unskilled manual workers) as a proportion of all residents in households;
• Residential mobility (2.68) - residents who changed address in the previous year as a percentage of all residents.

Each variable is firstly expressed as a proportion. The proportions are then transformed by first calculating the square root and then finding the equivalent arc sine (asin). The variables are expressed as z-scores and multiplied by their respective weighting factors. Z-scores express each variable in terms of its mean value in the population and its standard error. If this were not done, then variables with larger scales would have more weight than variables with shorter scales in the overall score. The final score is obtained by summing the transformed variables. Higher scores indicate greater levels of GP workload.

The index has been criticised as “being better at defining inner-city deprivation because it includes factors like overcrowding and ethnicity”.\(^{14}\) Talbot\(^{15}\) has extended this criticism by stating that “in particular, there is a strong bias towards London in the proportion of the population classified as deprived”. He goes on to state that “the index fails to recognise the nature of deprivation in the north of England…benefit[ing] the Thames regions at the expense of peripheral regions”.

Townsend Material Deprivation Score

The Townsend Score was developed for the Northern Regional Health Authority in order to address material aspects of deprivation, partly as a result of criticisms of the Jarman Index. It is based on just four variables, originally taken from the 1981 Census, that were selected to represent lack of material resources and insecurity, material living conditions, wealth, and income. The four variables are:

• Unemployment - unemployed residents aged 16-59/64 as a proportion of all economically active residents aged 16-59/64;
• Car ownership - households without a car as a proportion of all households;
• Home ownership - households that are not in owner occupied accommodation as a proportion of all households;
• Overcrowding - overcrowded households (more than one person per room) as a proportion of all households.
Two of the variables, unemployment and overcrowding, are firstly transformed using the log transformation \( y = \ln(x + 1) \) to produce more normal distributions. The four variables are then expressed as standardised z-scores and summed, with each variable being given an equal weight, to give the final Townsend score. Scores greater than zero indicate greater levels of material deprivation.

Unlike the Jarman score, the Townsend Score uses only direct measures of deprivation and does not include any indirect measures such as the elderly, ethnic minorities, and single parents. Townsend et al.\(^2\) highlighted that “even if many among these minorities are deprived, some are not, and the point is to find out how many are deprived rather than operate as if all are in that condition. It is the form which their deprivation takes and not their status which has to be measured”.

Townsend scores can be recalculated using the equivalent variables extracted for areas from the 1991 Census. However, it should be noted that the change in variable scores for any one area between 1981 and 1991 cannot be taken as indicative of reducing or increasing relative deprivation - primarily because of exogenous changes in the social characteristics of car and home ownership. Hence, explanatory models calibrated using 1981 Townsend scores should not be applied to 1991 scores without recalibration.

This index has been the most widely used, and has been considered one of the best indices available.\(^16\) However, it has been superseded to a large extent by the release of the ID 2000, and the subsequent ID 2004.

**Carstairs And Morris Scottish Deprivation Score (Also Called Scotdep)**

The index was constructed by Carstairs and Morris for the analysis of Scottish health data.\(^17\) It was developed as an alternative to the Townsend Index, incorporating different indicators to reflect specific characteristics of the Scottish highlands (e.g. lower female economic activity rates and higher social housing rates). However, it has also been used as a discriminator of health status in England. Like Townsend, the index is based on four variables, originally taken from the 1981 Census, which were judged to represent, or be determinants of, material disadvantage. Two of the indicators, overcrowding and access to a car, are the same as those used in Townsend. Unemployment is also still included, but is restricted to males only. For the fourth variable, the authors replaced housing tenure with an indicator of social class. They state “we do not find Townsend’s reasons for excluding social class convincing since we believe that being in a low social class, equally with being unemployed, places families in a position of poor access to material resources...”.\(^18\) The authors considered housing tenure to be “less relevant in Scotland as a much higher proportion of housing stock is in the public sector and the variable would not have acted as a discriminator between large sections of the population”.\(^19\) The units of measurement of the four indicators are:

- **Overcrowding** - residents in overcrowded households (more than one person per room) as a proportion of all residents in households;

- **Male unemployment** - unemployed male residents aged 16+ as a proportion of all economically active male residents aged 16+;

- **Social class IV or V** - residents in households with an economically active head of household in social class IV or V as a proportion of all residents in households;

- **No car** - residents in household with no car as a proportion of all residents in households.

The four variables are expressed as standardised z-scores and summed, with each variable being given an equal weight, to give the index score.

**Arbuthnott Index**

This index was developed by the Scottish Health Board and was used in their report “Fair Shares for All”.\(^20\) Their analysis found four key indicators of morbidity and deprivation that are significantly more successful than other indicators in explaining the differences observed in the use of services between postcode areas. These indicators were then used to construct a single index, the “Arbuthnott Index” for use in the allocation of resources to Health Boards. The four indicators are:

- **Mortality** - Standardised Mortality Ratios (SMRs) for persons aged under 65 (5-year average);

- **Unemployment** - persons claiming unemployment benefit as a proportion of all persons of working age;
• Elderly claiming income support - persons aged 65+ claiming income support as a proportion of all persons aged 65+;

• Households with two or more indicators of deprivation (unemployed or permanently sick head of household, low socio-economic head of household, overcrowded household, large household, lone parent household, or all elderly household) as a proportion of all households.

The four variables are calculated at the postcode sector level, expressed as standardised z-scores and summed, with each variable being given an equal weight, to give the index score. Positive scores indicate sectors with greater morbidity and deprivation.

This index is not a direct measure of healthcare needs; it is a measure of factors that influence these needs. Areas of the country in which there are high mortality rates among people under 65, high levels of unemployment, a high proportion of elderly people claiming income support, and a relatively high proportion of households with multiple deprivation are areas in which the population generally will tend to have relatively high needs for healthcare. Further details can be found on the Scottish Executive web site: [http://www.scotland.gov.uk/fairshares/docs/fsfa-00.asp](http://www.scotland.gov.uk/fairshares/docs/fsfa-00.asp)

**MATDEP And SOCDEP**

MATDEP (a material deprivation index) and SOCDEP (a social deprivation index) were developed by Forrest and Gordon following the 1991 Census. The distinction between material and social deprivation has been explicitly stated by Townsend: “Material deprivation entails the lack of goods, services, resources, amenities and physical environment which are customary, or at least widely approved in the society under consideration. Social deprivation, on the other hand, is non-participation in the roles, relationships, customs, functions, rights and responsibilities implied by membership of a society and its sub-groups. Such deprivation may be attributed to the affects of racism, sexism and ageism...” The distinction between material and social deprivation has two conceptual forms: “the argument between the use of direct and indirect measures and the different dimensions of deprivation when taking a social (roles and relationships) and a material (goods and services) perspective”.

Indicators used in MATDEP:

- Overcrowding: overcrowded households (more than 1 person per room) as a proportion of all households;
- Lack amenity: households lacking or sharing use of a bath/shower and/or inside WC as a proportion of all households;
- No central heating: households with no central heating as a proportion of all households;
- No car: households without access to a car as a proportion of all households.

Indicators used in SOCDEP:

- Unemployment: unemployed residents as a proportion of all economically active residents;
- Youth unemployment: unemployed residents aged 16-24 as a proportion of all economically active residents aged 16-24;
- Lone parents: lone parent households as a proportion of all households;
- Elderly: single pensioner households as a proportion of all households;
- Long-term illness: households containing a person with limiting long-term illness as a proportion of all households;
- Dependent only: households containing dependants only (e.g. single pensioners with long-term illness) as a proportion of all households.

MATDEP and SOCDEP scores are the summation of the unweighted standardised scores for each variable. Each variable is standardised by dividing the percentage value for each indicator in a particular geographic area by the maximum value for each indicator in all areas to give a value between 0 and 1. This means that the maximum score for SOCDEP is 6 and the maximum score for MATDEP is 4 (the minimum score for both indices is 0). Higher scores indicate greater levels of deprivation.

**Breadline Britain Score**
The Breadline Britain Score is the result of two surveys carried out by MORI for London Weekend Television and the Joseph Rowntree Foundation in 1983 and 1990. The 1983 study pioneered the use of the "consensual" or "perceived" deprivation approach to measuring poverty. The approach set out to determine whether there are people whose standard of living is below the minimum acceptable to society. The minimum standard of living was determined by interviewing a sample (based on age, sex, and working status) of 1,174 adults in 1983 and 1,831 adults in 1990. Aggregated data were weighted by age, household type, household tenure and ACORN housing type (see below) to be representative of the population of Great Britain. In order to ensure a large sample of people living in deprived areas, over-sampling was conducted in ACORN areas known to contain poor households.

In the 1990 Survey respondents were presented with a set of 44 cards on each of which was written the name of a different item covering a range of possessions and activities that relate to standards of living. For example: a television, a night out once a fortnight, and a warm waterproof coat. Respondents were asked to place the 44 cards into one of two boxes. Box A was for items which they considered necessary, i.e. those items which all adults should be able to afford and which they should not have to do without; Box B was for items which they considered to be desirable but not necessary. They were also asked if they felt differently about any of the items in the case of families with children. An item was deemed to be a socially perceived necessity if more than 50 per cent of respondents put it into Box A. Later in the interview the respondents were asked to assign one of the following 5 options to each of the 44 items:

- Have and couldn’t do without;
- Have and could do without;
- Don’t have and don’t want;
- Don’t have and can’t afford;
- Not applicable/don’t know.

Respondents (and their households) were assigned a deprivation index score each time they answered "don’t have and can’t afford" to an item that was considered to be a necessity by more than 50 percent of respondents.

Low Income Scheme Index (LISI) – A Deprivation Scale Based On Prescribing In General Practice

The indices listed so far are calculated for the resident populations of appropriate areas. Their values may not be reliable when attributed to the registered lists of General Practitioners, particularly if the persons registering with a particular practice do not represent an unbiased sample of the population of their area of residence. An alternative direct measure of practice list deprivation has been derived from prescription data. In 2001, more than 80 per cent of items were dispensed from prescriptions issued by NHS GPs in England were exempt from the prescription charge. Most of those exempt (over 60% of items) were on the basis of age (because the patient was under 16 or over 60). An additional number of items (almost 7%) were exempt because of what is termed HA exemption. This is due mainly to pregnancy but also includes a small number of specific diseases. However, over 11% of items were exempt because of low income (categories H, K, M, and N on the back of form FP10C). These low income categories cover recipients of family credit and income support and others who qualify on grounds of low income, and their dependants. The Low Income Scheme Index calculates the proportion of total cost in a practice going to patients who are exempt for these reasons. Note that the exemption data is only available for a 5% sample of prescriptions.

When the index was originally devised there was a problem where the prescription was dispensed to a dispensing patient. Early versions of the index therefore did not include practices where there were a large number of dispensing patients. However, the Prescribing Support Unit (PSU) has since produced complete sets for the periods November 2000 to October 2001 and for the financial years 2001/02 and 2002/03. A small number of practices continue to be excluded because they have very few patients (less than 500). The latest General Practice scores are available on the Prescription Pricing Authority’s (PPA) ePACT.net system or on request from the PSU.

Ideally the index should be used in conjunction with some measure of age, as a high proportion of age-exempt patients in an area may lower the proportion who claim exemption because of low income.

Deprivation Index Using The ONS Longitudinal Study

Using data from the ONS Longitudinal Study, a deprivation index has been calculated based on individual characteristics. This index has been used to compare trends in regional deprivation and mortality.

The ONS Longitudinal Study is a record linkage study of a representative sample of approximately one percent of the population of England and Wales (about 550,000 people). The initial sample, drawn from the 1971 Census, is continually updated to include new members through birth and immigration. Subsequent Census and vital event information is linked to the records of study members through the National Health Service Central Register (NHSCR).

For the calculation of this index, the 1981 cohort was used. Members of the cohort were classified by their place of residence in 1981, and, for those who survived the first 10 years of follow-up, by their place of residence in 1991. Follow-up for this study extended from Census day 1981 to the end of 1997.
Carstairs, a deprivation index based on individual characteristics was created for women and men of working age (26-59 and 26-64 years) in both time periods. Those aged under 26 years were excluded from the study to minimise the effects of ageing of the cohort. An index was created dependent upon study members being in Social Class IV and V (partly skilled or unskilled) or I, II and III (professional, managerial and skilled non manual and skilled manual), living in rented or owner occupied housing, with or without household access to a car, and being unemployed or employed. This was based on information provided at the 1981 and 1991 Censuses. The index takes four values:

1. (least deprived) – being social class I, II or III, in owner occupied housing, with car access and employed;
2. having one disadvantageous and three advantageous characteristics, e.g. being employed, but living in owner occupied accommodation, with access to a car and being social class I, II or III;
3. having two disadvantageous characteristics and two advantageous characteristics, e.g. being unemployed and living in rented accommodation, but having access to a car and being social class I, II or III;
4. (most deprived) – having at least three disadvantageous characteristics.

2001 Census Derived Deprivation Variable For Households

As part of the 2001 Census output, ONS has released the univariate table UV67 “Households by selected household characteristics”. The table is available for all areas from SOA to national (England & Wales) level, and provides the following information:

- Total number of households in each area;
- Number of households that have no selected characteristic in any dimension;
- Number of households that have a selected characteristic in each 1, 2, 3, or 4 dimensions.

The dimensions and their characteristics are:

- Employment:
  - Any member of the household aged 16-74 who is not a full-time student is either unemployed or permanently sick;
- Education:
  - No member of the household aged 16 to pensionable age has at least 5 GCSEs (grade A-C) or equivalent AND no member of the household aged 16-18 is in full-time education;
- Health and disability:
  - Any member of the household has general health “not good” in the year before Census, OR
  - Any member of the household has a limiting long-term illness;
- Housing:
  - The household’s accommodation is overcrowded, OR
  - The household’s accommodation is in a shared dwelling, OR
  - The household’s accommodation does not have sole use of bath/shower and toilet, OR
  - The household’s accommodation has no central heating.

This selection of household characteristics does not relate to any National Statistics indicator of deprivation or disadvantage. The classification is independent of the Index of Multiple Deprivation.

Area Classifications

In addition to the measures of deprivation that have been discussed above there are various area classifications which “cluster [geographically distant] places together on the basis of various socio-economic commonalities”.

The Office For National Statistics Area Classification 1991
- Superseded by The Office For National Statistics Area Classification 2001

The ONS Area Classification provides a general purpose summary indicator of the characteristics of each LA and HA in Great Britain. Using information collected at the 1991 Census, it classifies each LA into a hierarchical structure of one of six Families, 12 Groups and 34 Clusters (HAs are only categorised into Families and Groups) on the basis of 37 separate socio-demographic variables. The general choice of variables for the classification was determined by inclusion of:

- variables to represent the main dimensions of the 1991 Census data (demographic; employment and socio-economic; household composition and housing) bearing in mind the general-purpose use of the classification;
variables used in one or both of the 1971 or 1981 Office of Population Censuses and Surveys (OPCS) area classifications, or nearest equivalent variables, or a replacement which improves the classification process;

- variables available for the first time from the 1991 Census, such as ethnic group or limiting long-term illness, with potential significance for area classification.

The classification is based on LAs as they existed on Census Day in 1991 and on HAs as of 1 April 1994.

The ONS Area Classification is not actually an index of deprivation but an indicator of "socio-economic similarity and difference between areas". However, the term "deprivation" is used as a general descriptive term to refer to the values of a group of five variables which form part of the classification and which characterise generally poor socio-economic circumstances. These variables are: the standardised rate of limiting long-term illness; the percentage of children with a single parent; the percentage of dependants with a lone carer; the unemployment rate; and the percentage of households without a car. Authorities with high values for these variables are deemed to be the more socio-economically deprived.

The ONS Area Classification is used extensively for resource allocation and performance management purposes by the NHS and Department of Health.

The Office For National Statistics Area Classification 1991: Revised For Authorities In 1999 And Further Revised For Health Authorities In 2001

In 1999, ONS recalculated the ONS Area Classification to LA boundaries as of 1 April 1998 and HA boundaries as of 1 April 1999 following large organisational changes. In June 2001, ONS produced a further revision of the Area Classification for HAs to take account of the boundary changes that occurred on 1st April 2001. On that date the number of HAs in England was reduced from 99 to 95.

The revised version is not a new classification scheme. It has been compiled using the same method and approach as the original 1991 version, and the same 37 component variables from the 1991 Census. None of the data have been updated. ONS has simply attempted to reaggregate the data used in the classification to reflect the new LA and HA boundaries. The revision has, however, produced a slightly different classification solution. The clusters of similar authorities and the average characteristics for these clusters have necessarily changed as the LAs and HAs have changed. There is therefore little direct comparability with the results of the original classification. However, ONS has, where possible and where appropriate, retained some of the same names for the Families, Groups and Clusters within the classification.

The Office For National Statistics Area Classification 2001

In October 2003, ONS published a new Area Classification scheme for based on the 2001 Census. This was followed by the publication of the Classification for PCOs and wards in June 2004. The selection of variables for the classification followed similar principles to that used for the 1991 version. All possible Census variables available at the time, including all the variables used in the 1991 classification and new variables available for the first time, were considered. These were reduced in number to the minimum necessary to adequately describe the six main dimensions of Census data (demographic structure, household composition, housing, socioeconomic character, employment, and industry sector). Four methods were used to reduce the set of indicators:

- If an indicator didn't add anything to the classification or was considered unreliable it was removed;
- In some cases a composite indicator was used to represent similar indicators;
- Indicators that only identified very small sectors of the population were removed;
- If two of the remaining indicators were highly correlated (Pearson Correlation Coefficient > 0.85) one was removed. The rationale is that it is likely that highly correlated variables represent the same population characteristic and that the inclusion of both would result in overrepresentation of those characteristics.

The final data set contains 42 indicators. These indicators are then standardised using an inter-decile range method so that their scales are comparable. Ward’s clustering method is then used to group areas. This method starts by treating all the LAs (or wards) under consideration as individual clusters, and then combines clusters in such a way as to maximise the homogeneity within them. It uses every variable for each LA and the squared Euclidean distance is used to measure the similarity. The nature of this technique means that at the end of the process some LAs may be more similar to LAs in other clusters than they are to those in their own. To correct this, a k-means analysis is carried out to reassign any such areas to the cluster to which they are most similar.

The result of the clustering process is a three tier hierarchical classification consisting of 8 Supergroups, 13 Groups, and 24 Subgroups (9, 17, and 26 respectively for the ward level classification). In order to produce a similar hierarchical solution for both LAs and PCOs, the standardisation and clustering process for PCOs is made in reference to the LA indicator distributions and cluster characteristics, i.e. PCOs are assigned to the "closest" of the 24 LA subgroups.
For most purposes the Group tier is considered to be the optimum, and this is the level at which data for ONS Area Classifications (based on aggregating LAs) are presented within the Compendium.

The classification is presented based on boundaries as of April 2003.

Further details on the Area Classification and the methods used are available on the ONS web site: [http://www.statistics.gov.uk/about/methodology_by_theme/area_classification/default.asp](http://www.statistics.gov.uk/about/methodology_by_theme/area_classification/default.asp)

### Geo-Demographic Classifications

Geo-demographic classifications are not measures of deprivation, but they are used extensively for marketing purposes to target customer groups. The assumption is made that those households within a defined neighbourhood are likely to have similar lifestyles and buying habits. Like area classifications, they group geographically disparate places together on the basis of certain characteristics that distinguish customer groups. Traditional forms of social classification used for market research were based on the occupation of the head of the household in which they were categorised. Geo-demographics takes this concept further, and can be expressed as the classification of people by the neighbourhood in which they live and the similarity in terms of their ability to consume, behave, or purchase.

**ACORN – A Classification Of Residential Neighbourhoods**

ACORN is a geo-demographic classification developed by the market analysis company CACI. The classification is built entirely using Census data and includes information on age, sex, marital status, occupation, economic position, education, home ownership, and car ownership. Like the ONS Area Classification, ACORN is based on a three-tier system that classifies people living in Great Britain into one of 6 Categories, 17 Groups, and 54 Types (plus one unclassified in each case). Although not a true measure of deprivation, there are Groups and Types which relate to areas which have such characteristics as high unemployment, a high percentage of elderly with health problems, a high percentage of lone parents, and severe overcrowding.

**Super Profiles**

Super Profiles is another geo-demographic system, similar to ACORN, and is available from the market analysis company CLARITAS. It categorises households in Great Britain according to the characteristics of the neighbourhood in which they are located. The classification is derived from numerous data sources including the 1991 Census, the electoral roll, credit information, and market research data. The classification is again based on a three-tier system. At the most detailed level there are 160 different Super Profiles Clusters which are ranked in order of affluence. Each Cluster relates to one of 40 Market Groups, which in turn relate to one of 10 Lifestyles.

**MOSAIC**

MOSAIC is a geodemographic classification, built by Experian, that places each of the 1.4 million unit postcodes in Britain (with an average of 17 dwellings) into one of 52 distinct "lifestyle types" which describe their socio-economic and socio-cultural behaviour. Over 350 variables, taken from source such as the Census, Experian lifestyle surveys, Market Opinion Research Institute’s (MORI) Financial Survey, and Family Expenditure Surveys, are used in a cluster analysis to build the 52 neighbourhood types. These can be further aggregated to 12 MOSAIC groups.

**Health Action Zones**

Health Action Zones (HAZs) are seven-year multi-agency programmes involving the NHS, local government, the voluntary and private sectors, and community groups. The principal aim of HAZs is to tackle inequalities in health in the most deprived areas of England through health and social care service modernisation programmes and by addressing other interdependent and wider determinants of health such as housing, education and employment.

More than 20 indicators of deprivation were used for the selection of areas as Health Action Zones (HAZs). These included the 1998 DETR Index of Deprivation, Jarman Scores, Townsend Index, Poor Household Index, rough sleepers, psychiatric needs factor, community needs factor, unemployment, school exclusion, SMRs and a weighted health indicator based on *Our Healthier Nation* (OHN) target indicators. The analysis showed that the DETR index was highly correlated with most of the other indicators. But the data on other indicators were helpful when examining closely the characteristics of any particular area.

With a first wave at April 1998 and a second wave at April 1999, 26 HAZs were selected across England. They cover more than 50% of the population living in deprived areas in England. In total, HAZs include 73 LAs and a population of over 13 million people. HAZs differ in complexity and size, covering single to multiple Authorities with populations ranging from just under 200,000 to 1.4 million. HAZs also vary in their local characteristics and consequently different health and service priorities are addressed within each HAZ.
Health Poverty Index (HPI)

The NHS Plan (2000) proposed the production of a Health Poverty Index (HPI). It is intended to underpin national work on reducing health inequalities, combining data about health status, access to health services, uptake of preventive services and the opportunities to pursue and maintain good health (e.g. access to affordable nutritious food, physical activity and a safe, clean environment.) Following extensive consultation, the development of the HPI moved towards the presentation of a limited number of indicators covering each relevant “domain” rather than the production of a single index.

The function of the HPI is to provide key information on differences in the determinants of health and health outcomes between various groupings of society in a summary form. It should also allow these differences to be monitored over time. This will provide feedback and stimulate action on health inequalities.

Work on the HPI development is being funded by the DH and is being carried out by the School of Geography and Geosciences at the University of St Andrews, the Social Disadvantage Research Centre at the University of Oxford, and the South East Public Health Observatory (SEPHO). The current favoured presentation style uses spider charts, bar charts, and data tables to present the information on a web-based tool. A demonstration website has been launched for consultation at: [http://www.hpi.org.uk](http://www.hpi.org.uk).

Other Indices

There are also other less well known measures of deprivation that have been produced, mostly at local rather than national level. For example “Bradford” is a measure of social stress that was developed by Bradford Metropolitan Borough Council in 1993. Another measure is “Oxford”; this is an index developed by a team of researchers at Oxford University using a predictive model of low income (reference Noble et al (1994)). Both these indices and others are referenced in the proceedings of a one-day seminar “Deprivation Indices: Targeting Areas for Policy”, held on 24th November 1995 at the University of Birmingham.

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