Members' Research Service
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Cynulliad Cenedlaethol Cymru
National Assembly for Wales

Rural Development Sub-Committee

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Annex 2 - Welsh Index of Multiple Deprivation (WIMD) 2005 – Background Paper

The Welsh Index of Multiple Deprivation (WIMD) 2005 is the official measure of deprivation for small areas in Wales. The index is composed of seven deprivation domains, built from underlying domain-specific indicators, which are combined to give a single score.

The Index:

- Identifies concentrations of deprivation. Higher scores = more deprivation.
- Can be used to determine if an area is deprived; but not whether it is affluent.
- Scores cannot be compared with other indexes; however the indicator data on which they are based can be used to monitor areas over time.
- Provides no official overall local authority deprivation scores.
- Scores of different areas can be compared to see which is more deprived – but not by how much.

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1. Introduction to WIMD 2005

The Welsh Index of Multiple Deprivation (WIMD) 2005 is designed to model deprivation and is the official measure of deprivation for small areas in Wales. It was developed for the Welsh Assembly Government by the Assembly's Statistical Directorate and the Local Government Data Unit (Wales) and replaces the index which was produced in 2000. The new index was designed to be more transparent and easier to understand. The aim was that it would provide an overall measure of deprivation, and could be more easily applied to specific policy areas.

The index is composed of seven different deprivation domains, which in turn consist of a range of different indicators. These are weighted and combined in order to convert a group of separate measurements into a single score. Higher scores mean more deprivation. An area has a higher deprivation score than another if the proportion of people living there that are classed as deprived is higher. The area itself is not deprived; it is the circumstances and lifestyles of the people living within the area that affect its deprivation score.

The basic geographical unit of the index is the Lower Layer Super Output Area (LSOA). England and Wales have been divided into super output areas (SOAs) having roughly the same population. LSOAs are the smallest, and there are 1,896 LSOAs in Wales each with a population of approximately 1,500. The advantages of the LSOAs over electoral divisions (which were used for WIMD 2000) is that they are more stable, roughly equal in size and less subject to boundary changes. This new geography allows easier comparison of areas across Wales and allows smaller pockets to be visualised. Further information on SOAs is provided in **Annex A**.

2. Deprivation and poverty

The WIMD makes a distinction between deprivation and poverty and states that they deprivation and poverty are often used interchangeably; however a clear distinction should be made between these two different concepts. The Welsh Index of Multiple Deprivation defines them in the following way. **Poverty** refers to the condition of not having sufficient money, or other financial or material assets to meet needs. **Deprivation** refers to unmet need caused by lack of resources and opportunities in general, not merely financial or material resources.

The WIMD report goes on to explain that people can be regarded as being deprived if they lack what is generally accepted as the minimum material standards of diet, clothing and other essentials; and do not participate in employment or recreation. If the reason for the deprivation is lack of financial resources they are also then regarded as being in poverty. There is much more to deprivation than poverty, however poverty often constitutes a significant part of deprivation.

A further distinction is made in the WIMD report between **material deprivation** and **social deprivation**. People may not have access to material goods, facilities or amenities; but additionally they may not have access to routine social relationships and activities. These are different forms of deprivation, thus some people may experience several forms of deprivation and others only a single form.

Multiple deprivation

The WIMD considers that multiple deprivation is not a separate form of deprivation, it is a combination of the specific types of deprivation. As such, multiple deprivation is a complex concept and cannot be measured directly. However the component forms of deprivation (or deprivation domains and indicators) can each be measured to some extent. The different forms of deprivation cannot then merely be added together to give an overall index, as they may interact and have greater impact if found in certain combinations. It then follows that how components in the overall index are weighted and combined becomes a pivotal issue. Details of the specific domains, indicators and weightings can be found in **Annex B**.

3. Uses and limitations of WIMD 2005

The WIMD is not the only way to measure deprivation. The index has been developed for a particular purpose, that is, to measure concentrations of deprivation at the small area level. It highlights areas with high levels of multiple deprivation. However, not everyone in an area with a high concentration is deprived; and not all deprived people live in areas of high concentration. In using the index it is important to ask two questions:

- 'am I interested in localised concentrations of deprivation or all deprived people?'
- 'is deprivation actually concentrated in my area of interest?'

The index can be used for:

- giving an overall deprivation score for each of the LSOAs in Wales
- giving scores for each of the separate deprivation domains for each of the LSOAs
- comparing deprivation scores for two or more LSOAs
- ranking the scores for all, or a group of, LSOAs so they can be ordered in terms of most to least deprived, or vice versa.
- comparing two or more local authorities (or other aggregations of LSOAs) by looking at the proportion of the LSOAs within the group which fall within the most deprived (for example 10%) in all of Wales

The index provides a *relative* measure of deprivation. Therefore, there are several ways in which it is tempting to use the index, but **which may lead to unreliable results**.

- Small differences in rank/score are meaningless and do not imply significant differences between areas.
- The index cannot measure levels of difference between areas – for example if area A has a score of 40 and area B a score of 20, this does not follow that A is twice as deprived as B. Similarly, an area ranked 200th is not twice as deprived as an area ranked 100th.

- A lack of deprivation does not imply affluence. An area ranked low can be said to be more deprived, but cannot be said to be less affluent. The index counts only those who are classified as deprived and does not take into account the situation of those who are not, whether they are nearly deprived or wealthy.

- It is not valid to make comparisons of ranks/scores between WIMD 2005 and the 2000 index, or deprivation indexes of other countries.

- The index is not a suitable tool for monitoring individual areas – however it may be viable to use data from underlying indicators to monitor change over time[1].

- Ranks/scores cannot be averaged to give a value for higher geographies – comparisons of larger areas can be done; for example the percentage of LSOAs in the most deprived ten percent.

[1] Data is available at indicator level for the income, employment, education and access to services domains. This can be obtained from StatsWales tables 002853, 002854 and 002855,

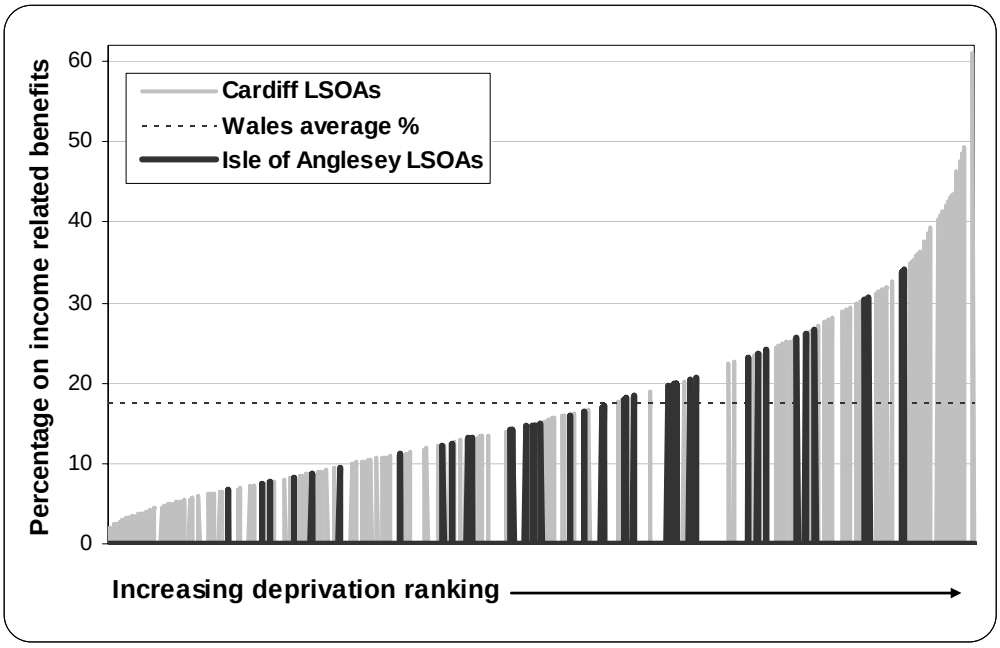
Use of WIMD 2005 in assessing rural deprivation

Not all people living in areas with high levels of deprivation will be deprived. Similarly, some deprived people will live in areas with low levels of deprivation. For example, over half of all income-deprived people live in the 30% most deprived LSOAs. The remaining half is sparsely spread over the other 70% of LSOAs. The index is designed to identify concentrations of deprivation. If there are not a large number of deprived people living in an area, the area will not be identified as being deprived by the index. This is particular relevant for rural areas.

Figure 1 draws on an example taken from the recent WIMD consultation report[2]. It shows the distribution of income deprivation in Cardiff and Anglesey. These two authorities have been chosen as they are not dissimilar in the percentage of people on income-related benefits across the authority (17.9% for Cardiff and 17.6% for Anglesey). However, the distribution of income deprivation is very different.

In the chart below, each Cardiff LSOA is represented by a grey line and each Anglesey LSOA by a black line. The dotted horizontal line is the Wales average for the percentage of people on income-related benefits. Cardiff has LSOAs at both extremes of the index, whereas for Anglesey the distribution is more clustered away from the extremes. This implies that the income-deprived population of Anglesey is more sparsely distributed across the authority, rather than there being very high or very low income-deprived areas.

Figure 1. Percentage on income related benefits by LSOA, ranked position in Wales, WIMD 2005



Source: WIMD 2008 consultation document

As a result, Cardiff will appear to have more income deprivation than Anglesey because of the higher concentrations in certain LSOAs.

[2] Welsh Assembly Government, Consultation on the proposed indicators for updating the Welsh Index of Multiple Deprivation, June 2007: http://new.wales.gov.uk/consultations/closed/statscloscons/consultation-wimd2008/?lang=en

4. Patterns of deprivation by domain index

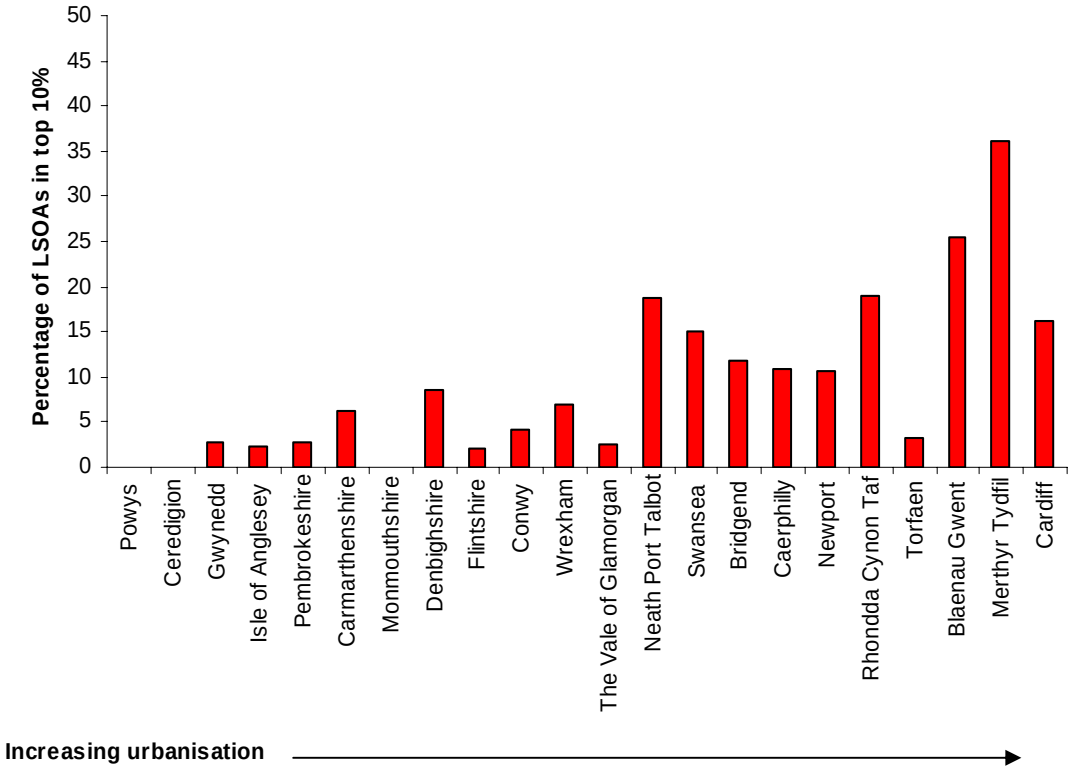
This section summarises the patterns of deprivation identified for the overall index and each of the domains. Further information on the domains, their indicators and how these are weighted and combined is provided in **Annex B**.

4.1. Overall Index

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms of overall deprivation, are Cardiff (33 LSOAs), Rhondda Cynon Taff (28 LSOAs) and Swansea (22 LSOAs).

Figure 2 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of overall deprivation. Local authorities have been ranked in order of increasing urbanisation[3]. Authorities with the highest **percentage of their SOAs in the most deprived 10%** in Wales were Merthyr Tydfil (36%), Blaenau Gwent (26%), Rhondda Cynon Taff (19%) and Neath Port Talbot (19%).

Figure 2. Percentage of SOAs in 10% most deprived in Wales – overall deprivation



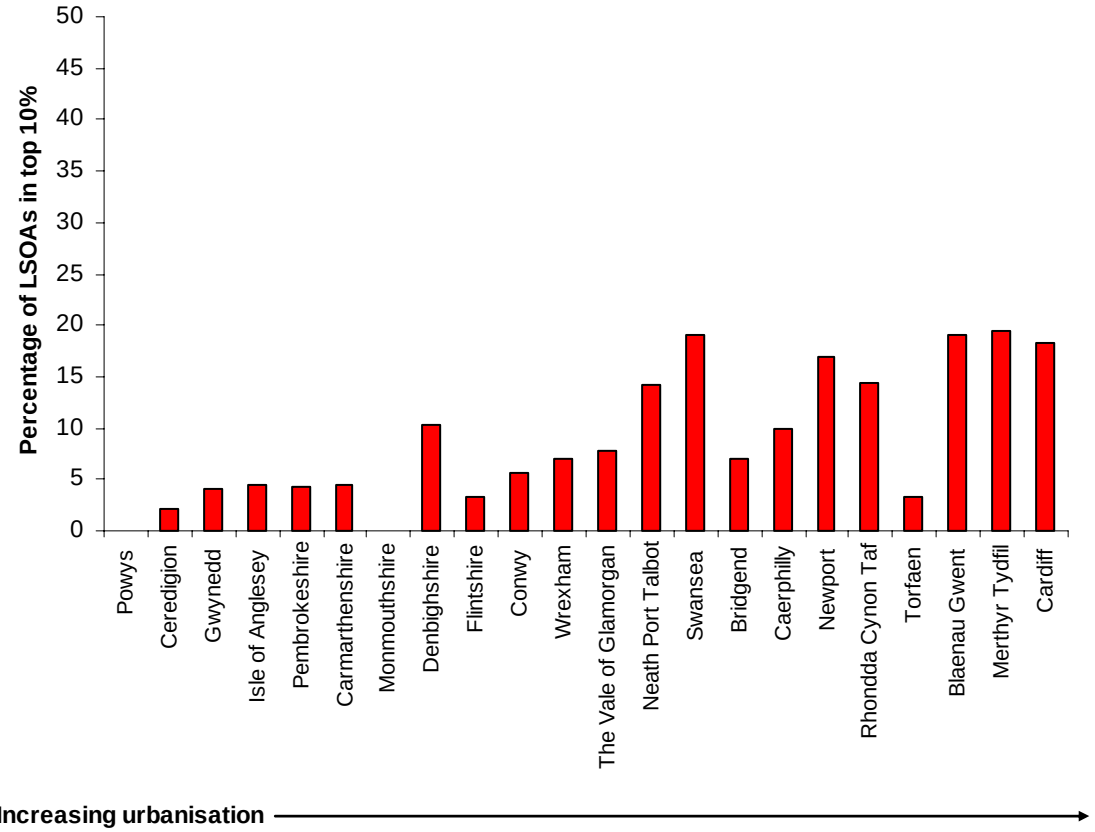
[3] Local authorities are ranked as to their level of urbanisation. This classification was conducted using the Rural and Urban Classification 2004, Office for National Statistics.
http://www.statistics.gov.uk/geography/nrudp.asp

4.2. Income Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms income deprivation, are Cardiff (37 LSOAs), Swansea (28 LSOAs) and Rhondda Cynon Taff (22 LSOAs).

Figure 3 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of income deprivation. Local authorities have been ranked in order of increasing urbanisation[4]. Authorities with the **highest percentage of their SOAs in the most deprived 10%** in Wales were Blaenau Gwent (19%), Merthyr Tydfil (19%), Swansea (19%), Cardiff (18%), and Newport (17%).

Figure 3. Percentage of SOAs in 10% most deprived in Wales – income domain



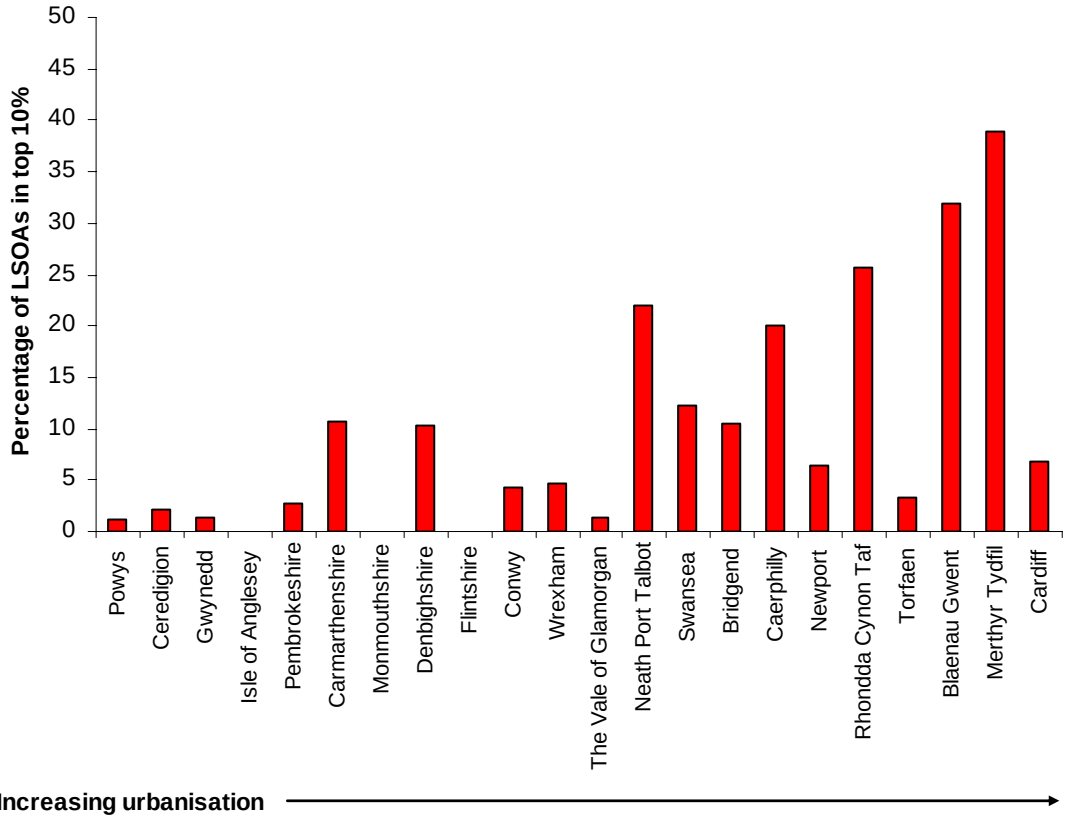
[4] Local authorities are ranked as to their level of urbanisation. This classification was conducted using the Rural and Urban Classification 2004, Office for National Statistics.
http://www.statistics.gov.uk/geography/nrudp.asp

4.3. Employment Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms employment deprivation, are Rhondda Cynon Taff (39 LSOAs), Caerphilly (22 LSOAs), and Neath Port Talbot (20 LSOAs).

Figure 4 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of employment deprivation. Authorities with the **highest percentage of their SOAs in the most deprived 10%** in Wales were Merthyr Tydfil (39%), Blaenau Gwent (32%), Rhondda Cynon Taff (26%), Neath Port Talbot (22%), and Caerphilly (20%).

Figure 4. Percentage of SOAs in 10% most deprived in Wales – employment domain

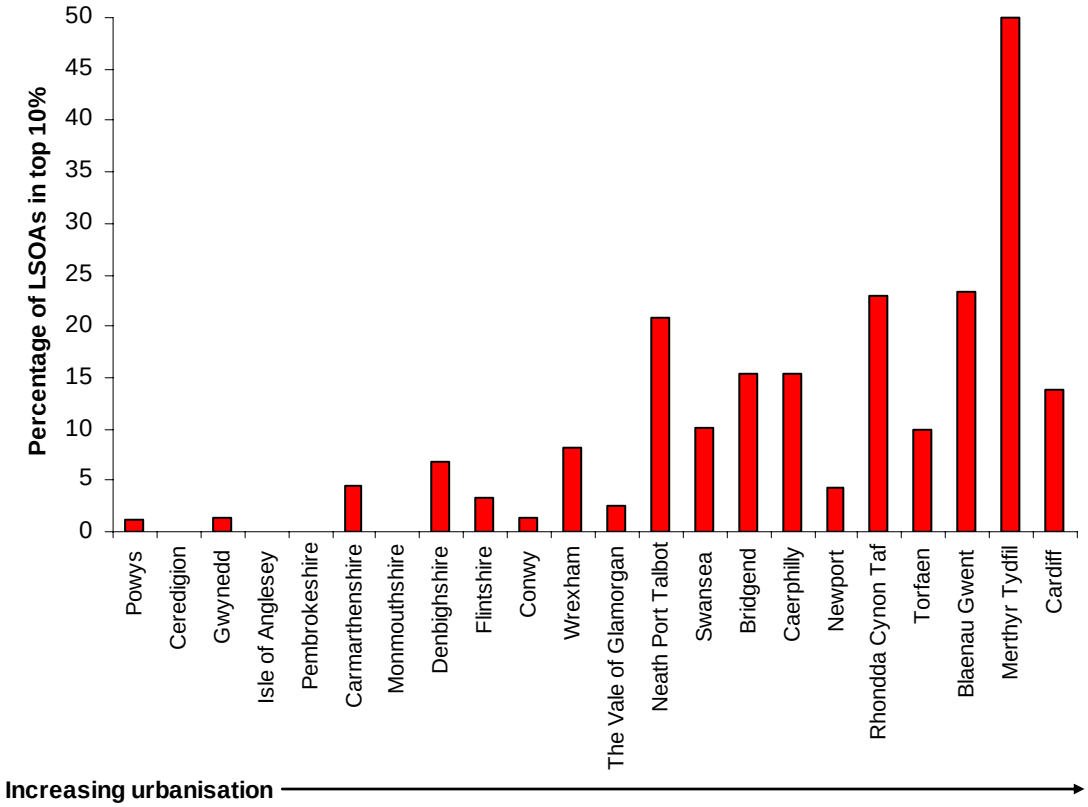


4.4. Health Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms health deprivation, are Rhondda Cynon Taff (35 LSOAs), Cardiff (28 LSOAs), and Neath Port Talbot (19 LSOAs).

Figure 5 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of health deprivation. Authorities with the **highest percentage of their SOAs in the most deprived 10%** in Wales were Merthyr Tydfil (50%), Rhondda Cynon Taff (23%), Blaenau Gwent (23%), and Neath Port Talbot (21%).

Figure 5. Percentage of SOAs in 10% most deprived in Wales – health domain

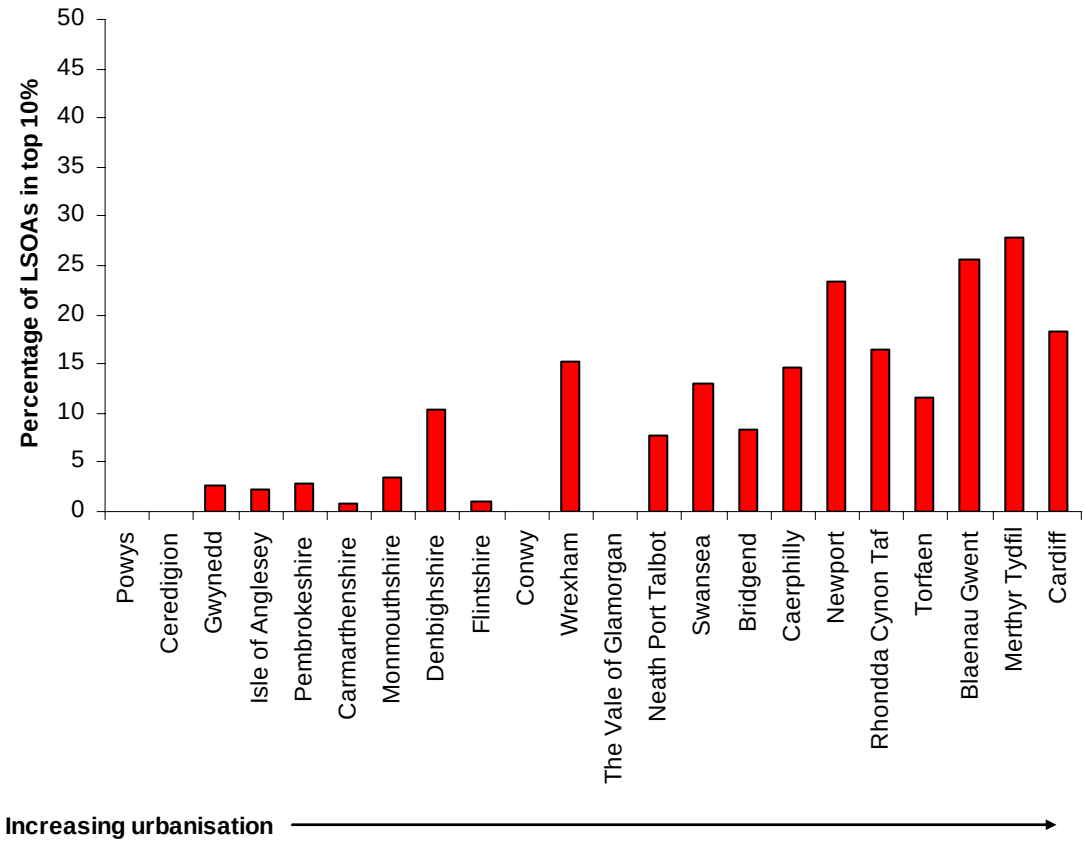


4.5. Education, Skills and Training Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms education deprivation, are Cardiff (37 LSOAs), Rhondda Cynon Taff (25 LSOAs), Newport (22 LSOAs) and Swansea (19 LSOAs).

Figure 6 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of education deprivation. Authorities with the **highest percentage of their SOAs in the most deprived 10%** in Wales were Merthyr Tydfil (28%), Blaenau Gwent (26%), and Newport (23%).

Figure 6. Percentage of SOAs in 10% most deprived in Wales – education domain

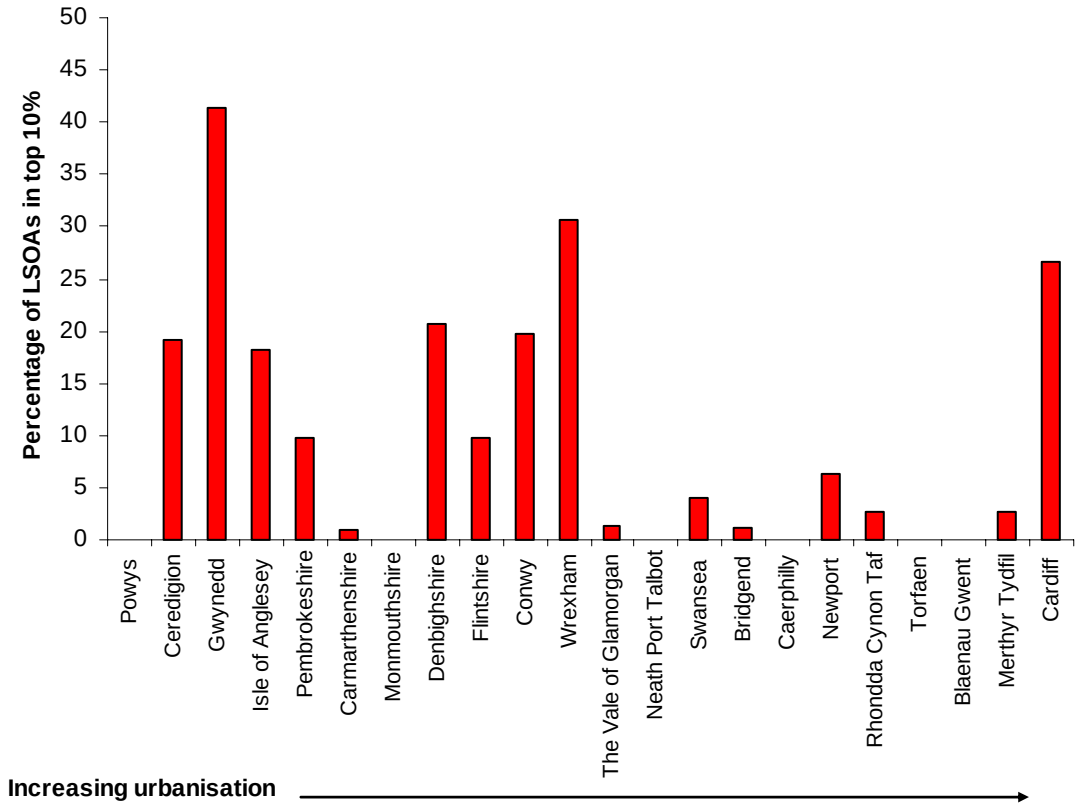


4.6. Housing Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms housing deprivation, are Cardiff (54 LSOAs), Gwynedd (31 LSOAs) and Wrexham (26 LSOAs).

Figure 7 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of housing. Authorities with the highest **percentage of their SOAs in the most deprived 10%** in Wales were Gwynedd (41%), Wrexham (31%), Cardiff (27%), Denbighshire (21%), Conwy (20%), Ceredigion (19%) and the Isle of Anglesey (18%).

Figure 7. Percentage of SOAs in 10% most deprived in Wales – housing domain

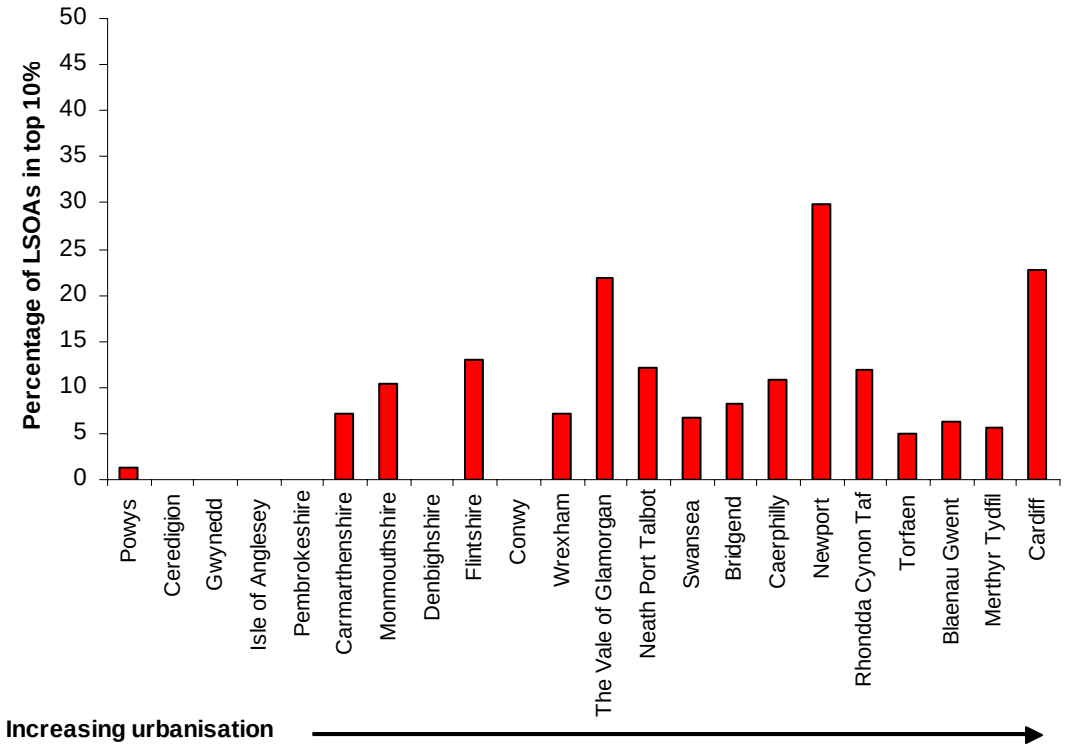


4.7. Physical Environment Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms physical environment, are Cardiff (46 LSOAs) and Newport (28 LSOAs).

Figure 8 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of physical environment. Authorities with the highest **percentage of their SOAs in the most deprived 10%** in Wales were Newport (30%), Cardiff (23%) and the Vale of Glamorgan (22%).

Figure 8. Percentage of SOAs in 10% most deprived in Wales – physical environment domain

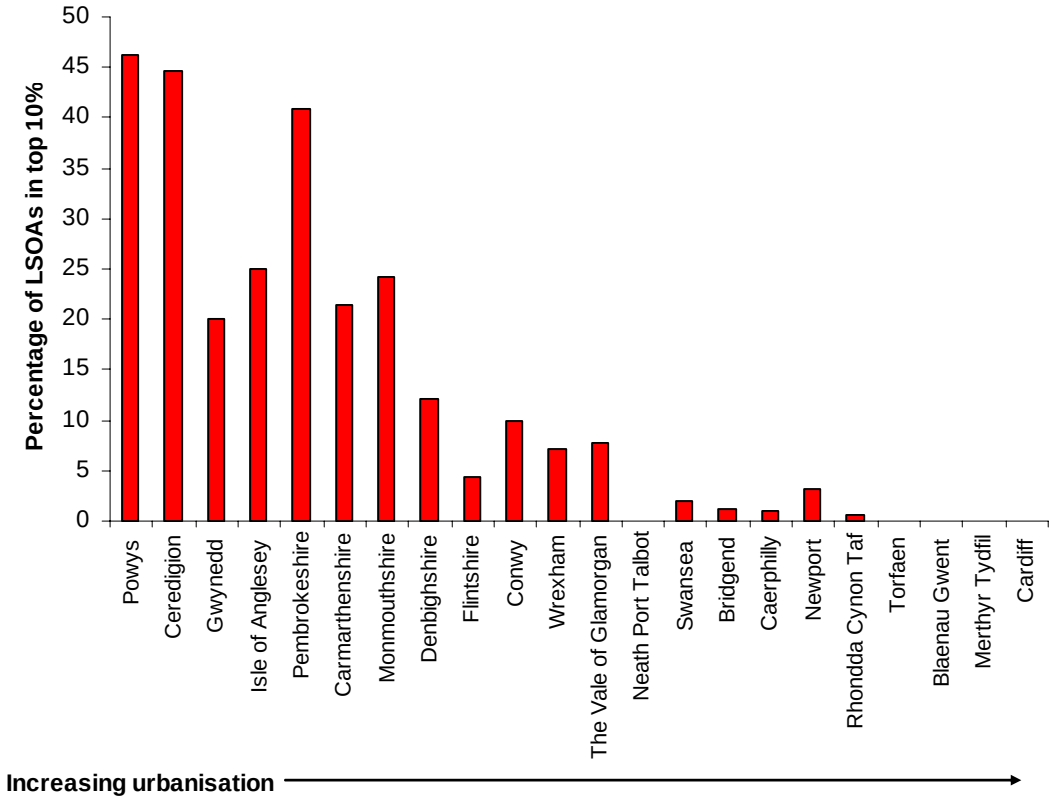


4.8. Geographical Access to Services Domain

Within the 190 (10%) most deprived LSOAs in Wales, the local authorities which feature most predominantly, in terms access to services, are Powys (37 LSOAs), Pembrokeshire (29 LSOAs), Carmarthenshire (24 LSOAs) and Ceredigion (21 LSOAs).

Figure 9 provides a summary of the percentage of SOAs within each local authority that fall within the top 10% most deprived SOAs in terms of access to services. Authorities with the highest **percentage of their SOAs in the most deprived 10%** in Wales were Powys (46%), Ceredigion (45%), Pembrokeshire (41%), Isle of Anglesey (25%), Monmouthshire (24%), Carmarthenshire (21%) and Gwynedd (20%).

Figure 9. Percentage of SOAs in 10% most deprived in Wales – access to services domain



5. WIMD 2008

The Welsh Assembly Government plans to update the Welsh Index of Multiple Deprivation in 2008 using more up-to-date data and improved indicators based on the lessons learned from the 2005 index. A consultation on the domains and indicators to be included in the updated index was published in June 2007, with the consultation closing on 7 September. The Welsh Assembly Government will issue a response to the consultation in November and plan to publish the updated index in summer 2008.

The consultation document[5] outlines proposed changes to the indicators and provides commentary on additional indicators that were considered, but have not been proposed for inclusion in the updated index.

The main changes to the 2008 index are summarised in **Table 1** below.

Table 1. Proposed changes to indicators for WIMD 2008

Domain	Proposed changes
Income	The proposed sole indicator for the income domain is based on an income estimates project being undertaken by Essex University. This would provide estimates of income at lower super output area and the number of households below a certain threshold of income. If the findings of this project are robust, this will be the only indicator in the income domain and will replace income proxies such as benefit claimants. If income estimates are not used, a series of benefit-related indicators is proposed.
Health	A new indicator of singleton low birth weight is proposed to be included in the health domain for 2008.
Education	A new indicator of primary school absence rates is proposed. The further and higher education indicator from WIMD 2005 is proposed to be split into 2 separate indicators.
Geographical Access to Services	A new indicator relating to access to transport nodes is proposed. This would measure the ability to access long distance rail and coach services.
Housing	Indicators used in 2005 are proposed to be replaced by indicators of fuel poverty (as a proxy for energy efficiency and quality of housing) and cost of housing per square metre.
Physical Environment	Ground movement risk is proposed as a potential new indicator, which would assess risk of "shrink swell" and "slope instability".
Community Safety	A new domain for 2008, this would include figures on police recorded crime, youth offenders, adult offenders and fire safety. The weighting of this domain would come from an adjustment to the weights of the 4 largest domains.

Source: WIMD 2008 consultation document

[5] Welsh Assembly Government, Consultation on the proposed indicators for updating the Welsh Index of Multiple Deprivation, June 2007: http://new.wales.gov.uk/consultations/closed/statscloscons/consultation-wimd2008/?lang=en

Annex A Super Output Areas

Super output areas are a new geographical hierarchy developed by the Office for National Statistics (ONS)[6] which are designed to improve the reporting of small area statistics in England and Wales. They have increasingly been used to report data on the Neighbourhood Statistics (NeSS) website and it is anticipated that they will eventually become standard for the production of National Statistics.

Electoral divisions (also known as wards) were the previous standard geographical unit, however this approach had disadvantages. Electoral divisions vary greatly in size, which is not ideal for making comparisons across Wales, and may also lead to data being unable to be released for smaller areas due to disclosure rules. In addition to this, the boundaries of electoral divisions are subject to change, which creates problems when trying to make comparisons over time. In response to these problems, ONS developed a range of areas which are of consistent size and with fixed boundaries. These were built from groups of the Output Areas (OAs) used for the 2001 Census and would be termed Super Output Areas (SOAs).

There are three layers of SOAs:

- Lower Layer SOA – must have a minimum population of 1,000. The mean size of all the SOAs must be close to 1,500. These are built from groups of Census OAs (generally between 4 and 6).

- Middle Layer SOAs – must have a minimum population of 5,000. The mean size of all the SOAs must be close to 7,200.

- Upper Layer SOAs – must have a minimum population of 25,000; the formal definition has not been finalised.

There are 1,896 Lower Layer SOAs in Wales (34,378 in England and Wales). These were generated by a computer program which merged OAs taking into account population size, mutual proximity and social homogeneity. **Table 2** demonstrates the number of LSOAs in each local authority in Wales.

There are 413 Middle Layer SOAs in Wales (7,193 in England and Wales). These were generated in two stages: a draft set was generated automatically (similar to LSOAs), then local authorities and other local agencies were invited to propose changes to the draft boundaries in order to establish areas that better met local needs.

The Upper Layer SOAs have yet to be formally defined.

[6] Methodology used for producing ONS small area population estimates, Office for National Statistics. http://www.statistics.gov.uk/CCI/article.asp?ID=1665&Pos=2&ColRank=2&Rank=224

Table 2. Number of Lower Layer SOAs by local authority

Local Authority	Number of LSOAs
Isle of Anglesey	44
Gwynedd	75
Conwy	71
Denbighshire	58
Flintshire	92
Wrexham	85
Powys	80
Ceredigion	47
Pembrokeshire	71
Carmarthenshire	112
Swansea	147
Neath Port Talbot	91
Bridgend	85
Vale of Glamorgan	78
Rhondda Cynon Taff	152
Merthyr Tydfil	36
Caerphilly	110
Blaenau Gwent	47
Torfaen	60
Monmouthshire	58
Newport	94
Cardiff	203
Wales	**1,896**

Source: WIMD 2005, Welsh Assembly Government.

Annex B Domains, Indicators and Weighting in WIMD 2005

WIMD is composed of seven different domains (or types) of deprivation: income, employment, health, education, housing, geographical access to services and physical environment. Each domain consists of a series of specific indicators. For each domain, a single measure (a domain index) has been created to provide information about the specific deprivation related to each domain, in addition to their contribution to the overall index.

If the indicators in each domain were simply added together to form a domain index, this would infer that they were judged to be of equal importance in their contribution to the index – this is not generally the case. Thus, for some domains factor analysis[7] has been used to identify the weights for each indicator on the underlying scale of deprivation for that domain. For other domains the combination of indicators is more straightforward. The domain score is then a combination of the component indicators weighted according to the factor analysis results. The indicator weights are shown in **Table 3**.

In some areas, particularly where the population is small, data can be unreliable with particular SOAs getting unrepresentative scores on indicators in certain domains. This unreliability can be overcome by using shrinkage algorithms. Shrinkage involves moving unreliable SOA scores towards the mean score of the local authority that the SOA belongs to.

Thus, each domain is summarised as a single measure (a domain index), and these are then combined to generate the overall index. As each domain index is based on indicators, which are measured via different methods and using different units, the measurements must be transformed prior to combining in order to make them compatible. The domain indexes are then weighted and combined to give the overall index. The domain weights are also shown in **Table 3**. Income and employment were classed as the most important factors, and thus were given the biggest weighting in the overall index. Although there is more to deprivation than poverty, poverty is a significant contributory factor towards deprivation.

The procedures involved in transformation, factor analysis and shrinkage are explained in more detail in the *WIMD Technical Report*[8].

[7] Factor analysis is a set of methods for assessing the extent to which a set of indicators may all be measuring the same underlying factor (eg the domain). This involves assigning weights to the indicators on the basis of the strength of the correlation between the indicators and the underlying domain.
[8] WIMD 2005 – Technical Report, Welsh Assembly Government.
http://new.wales.gov.uk/topics/statistics/theme/wimd2005/results/technical/?lang=en

Table 3. Domains, indicators and weighting used in WIMD 2005

Domain and indicators	Devolved?	Weighting
Income	**No**	**25%**
Income Support claimants (and their children and partners)		
Income-based Job Seeker's Allowance		Straightforward addition
Working Families' Tax Credit		
Disabled Person's Tax Credit		
Employment	**No**	**25%**
Claimants of unemployed related benefits		
Claimants of Incapacity Benefit		Straightforward addition
Severe Disablement Allowance (for women under 60 and men under 65)		
Participants on New Deal for Young People and Intensity Activity Period (for New Deal 25+)		
Health	**Yes**	**15%**
Limiting long-term illness		0.29
Deaths		0.55
Cancer incidence		0.20
Education, Skills and Training	**Yes**	**15%**
Key Stage 2 average points scores		0.11
Key Stage 3 average points scores		0.24
Key Stage 4 average points scores		0.25
Proportion of adults with low or no qualifications		0.31
Proportion of 17 and 18 year olds not entering further or higher education		0.15
Secondary school absence rates		0.08
Housing	**Yes**	**5%**
Lack of central heating		Equal weighting
Overcrowding (excluding all student households)		
Physical Environment	**Yes**	**5%**
Air quality		
Air emissions		Combined into 3 sets and equally weighted (a)
Living within 1km of a waste disposal site		
Proportion of people living within 1km of an Environment Agency regulated industrial source		
Proportion of people living in an area with a significant risk of flooding		
Geographical access to services	**Yes in part (b)**	**10%**
Access to food shop (within 10 minutes)		0.08
Access to GP surgery (within 15 minutes)		0.15
Access to primary school (within 15 minutes)		0.24
Access to post office (within 15 minutes)		0.24
Access to public library (within 15 minutes)		0.07
Access to leisure centre (within 20 minutes)		0.07
Access to NHS dentist (within 20 minutes)		0.12
Access to secondary school (within 30 minutes)		0.12

Source: Welsh Index of Multiple Deprivation.

(a) Physical environment indicators were combined into 3 sets and weighted equally. The sets were air pollution (emissions and quality), proximity to regulated sites and flooding.

(b) The provision of services is a matter for the Welsh Assembly Government, however the Post Office network overall is a non-devolved matter.