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Consultation Document

Proposed indicators for the Welsh Index of Multiple Deprivation 2019

Date of issue: 22 October 2018

Action required: Responses by 17 December 2018

Mae'r ddogfen yma hefyd ar gael yn Gymraeg.

This document is also available in Welsh.

Overview	This consultation is about proposed indicators for the Welsh Index of Multiple Deprivation 2019.
How to respond	The closing date for responses is midnight on 17 December 2018. Responses can be submitted using the online form. Alternatively, a response form is also provided which can be returned by email to: stats.inclusion@gov.wales Or by post to: Social Justice Statistics Team Welsh Government Cathays Park Cardiff CF10 3NQ
Further information and related documents	**Large print, Braille and alternate language versions of this document are available on request.** The consultation document can be accessed from the Welsh Government website. A consultation webinar (online consultation seminar) will be held on 7 November and 3 December, with a Welsh language session on 29 November.
Contact details	For further information: Social Justice Statistics Team Welsh Government Cathays Park Cardiff CF10 3NQ stats.inclusion@gov.wales

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The Welsh Government will be data controller for any personal data you provide as part of your response to the consultation. Welsh Ministers have statutory powers they will rely on to process this personal data which will enable them to make informed decisions about how they exercise their public functions. Any response you send us will be seen in full by Welsh Government staff dealing with the issues which this consultation is about or planning future consultations. Where the Welsh Government undertakes further analysis of consultation responses then this work may be commissioned to be carried out by an accredited third party (e.g. a research organisation or a consultancy company). Any such work will only be undertaken under contract. Welsh Government's standard terms and conditions for such contracts set out strict requirements for the processing and safekeeping of personal data.

In order to show that the consultation was carried out properly, the Welsh Government intends to publish a summary of the responses to this document. We may also publish responses in full. Normally, the name and address (or part of the address) of the person or organisation who sent the response are published with the response. **If you do not want your name or address published, please tell us this in writing when you send your response**. We will then redact them before publishing.

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1. Introduction

The Welsh Index of Multiple Deprivation (WIMD) is the Welsh Government's official measure of relative deprivation for small areas in Wales. It is designed to identify those small areas where there are the highest concentrations of several different types of deprivation. It is a National Statistic and is produced by statisticians at the Welsh Government.

The latest index was published in 2014. Information on WIMD 2014 is available on the Welsh Government website.

An updated index will be published in autumn 2019, where possible using more up-to-date data and new indicators following a review of the available data.

Since the lead-up to the last index in 2014, there has been significant change to the context for a small area measure of deprivation in Wales. Motivations for most of the known uses of the index (as described in section 3.3) remain. However Communities First, a key Welsh Government programme targeted on the most deprived areas (and a key use of the first WIMD in 2000), has been phased out. On the other hand, key new pieces of legislation have been put in place with an emphasis on local assessments and plans for public services in Wales, including the Well-being of Future Generations (Wales) Act 2015, and the Social Services and Well-being (Wales) Act 2014.

Since 2014 there have also been many changes to the data sources that could potentially yield indicators for WIMD. In all but one domain we are either being driven to change indicators through strategic developments (such as Universal Credit, and Key Stage 4 school attainment measures) or are planning to exploit new datasets offering measurement of relevant concepts (such as childhood weight, and access to green spaces).

The individual indicators underlying WIMD are the building blocks for the whole index. The significant indicator development work mentioned above has led us to propose several improvements to WIMD for 2019, more so than in the last few Index updates. The purpose of this consultation is to expose the current proposals for indicators to feed into WIMD 2019 to critical review. We are consulting at this stage to allow time for consultation responses to be acted upon, where possible, prior to finalising the details for WIMD 2019.

This document details our current thinking on indicators and how they are weighted together. Some of the proposals aim to take advantage of newly available data, and this may mean we describe work-in-progress rather than a fully-formed indicator description, at this stage.

The consultation is open to all individuals and organisations. Respondents are not required to answer all questions.

A summary of responses received to this consultation will be published in spring 2019.

The consultation exercise begins on 22 October 2018 and **17 December 2018 is the deadline for responses**.

2. Summary

The aim of this consultation is to seek user views on proposals for WIMD 2019 indicators. In order to develop the indicator proposals, statisticians at the Welsh Government worked with seven expert topic groups to review indicators used in WIMD 2014, issues raised in the 2014 consultation, and to consider potential new data sources.

Wherever possible the proposed indicators conform to a list of indicator criteria. Further information on the process for developing these proposals is outlined in Section 4.

Full details of the proposed indicators for WIMD 2019 are listed in Section 5. Details of indicators considered but rejected are also given, with an indication of whether we will review them again for future iterations of the index. Some sections describe on-going work to explore the accessibility and suitability of indicators for WIMD 2019. In some cases, we describe a preferred approach for an indicator, alongside the other options. We welcome user views on all these indicator proposals.

The consultation questions are summarised on page 10. The questions are also listed at the appropriate point within the consultation document.

An online form or a separate response form can be accessed from the Welsh Government's website.

Respondents are not required to answer all questions.

A consultation webinar (online consultation seminar) will be held on 7 November and 3 December, with a Welsh language session on 29 November. This will include a presentation on the proposals together with an opportunity to ask questions.

2.1. Overview of proposals

This section summarises the proposals for each domain at a high level. Overall, our research has suggested possible improvements to WIMD that could be made through:

A. development of modelled estimates of poor housing quality
B. development of different indicators on Key Stage 4 school attainment, air quality and mortality
C. exploration of new data sources for indicators on:
    - low household income
    - unhealthy weight in children
    - GP-registered chronic and mental health conditions
    - education and skills in the early years
    - progression to Higher Education
    - access to natural green spaces, and
    - access to superfast broadband

Implementing all of these improvements would involve a significant amount of work for the team of statisticians who produce WIMD. After surveying our users in 2016, we have previously committed to prioritising improvement to the housing domain as described in A. Changes listed in B are either necessary or straightforward to do. Considering the potential new data sources referred to in point C, we welcome views on how we should prioritise the proposed areas, if necessary.

- Do you have any views on prioritisation for exploring new data sources for WIMD 2019 as described in section 2.1 point C?

Income domain

We propose to use data at a point in time before the start of rollout of Universal Credit full service in Wales (therefore the 2016-17 financial year). This does not impact much on the currency of the data compared to previous indices.

We are also exploring new research outputs on income from the Office for National Statistics (ONS), which are based on linked administrative data. We hope to develop an indicator on households with low income for inclusion alongside the existing indicator.

Employment domain

We propose to use data at a point in time before the start of the rollout of Universal Credit full service in Wales (2016-17 financial year). This does not impact much on the currency of the data compared to previous indices.

Health domain

- Indicators that are related to children
    - We propose to supplement a measure of birth weight with a new measure on reception class children who are of unhealthy weight
- Indicators that capture specific diagnosed conditions
    - We hope to expand the range of indicators from cancer incidence alone, to include a suitable measure of chronic conditions and of mental health
- Indicators that capture the status of the population's health more broadly
    - We plan to retain a self-reported measure of limiting long-term illness, and refine the mortality measure to focus on premature deaths

Education domain

- Early years indicators:
    - We propose to include an indicator sourced from On-Entry Assessments of Pupils in Reception Class in order to capture educational development in pre-school years.
- School outcome / absenteeism indicators:
    - We intend to retain the Key Stage 2 average point score and repeat absenteeism indicators from WIMD 2014, develop a new Key Stage 4 average point score indicator and introduce a Foundation Phase average point score indicator sourced from outcomes data at the end of year 2.
- Post-compulsory education / wider population indicators:
    - We plan to retain the proportion of people not entering higher education aged 18-19 and number of adults aged 25-64 with no qualifications indicators from WIMD 2014. However, we intend to explore potential alternative data sources for the former indicator.

Access to Services domain

In the latest Index this domain measured travel times to 8 services using public transport and 9 services using private transport. We propose to introduce a separate measure of access to broadband services into the domain. This is subject to a review of new coverage data to be released by Ofcom in 2019. We therefore propose to implement minimum change to the list of services that we measure travel time to, compared to WIMD 2014.

Housing domain

For WIMD 2014 there was a lack of appropriate small area data available and it was not possible to fully measure housing deprivation according to our definition. Our proposed approach for WIMD 2019 is to work towards including the following indicators in the domain:

- Overcrowding (2011 Census-based bedroom measure) to capture availability and to some extent living condition
- The proportion of dwellings with Category 1 hazards under the Housing Health and Safety Rating System (modelled, exact definition and available sub-categories to be developed), to capture both physical and living conditions
- A further measure of physical and living condition such as overall disrepair (modelled, exact definition to be developed)

Physical Environment domain

- Proportion of Households at Risk of Flooding
    - We propose to retain this indicator but derive it from the Flood Risk Assessment Wales (FRAW) data currently being developed by Natural Resources Wales
- Air Quality Score
    - We intend to simplify this by calculating three indicators based on the population weighted averages concentration values of Nitrogen Dioxide, PM_{10} and $PM_{2.5}$
- Lack of Proximity to a Natural Green Space
    - We plan to develop an indicator measuring the proportion of households with a lack of proximity to accessible natural green space. This indicator/sub domain will replace the proximity to waste disposal and industrial sites indicator used in previous iterations of WIMD.

Community Safety domain

We are proposing that no substantive changes are made to the indicators in this domain.

2.2. Questions proposed in this document

Domain Proposals (see Section 5)

These are the specific questions that will help shape the development of WIMD 2019. Respondents are not required to answer all questions.

Overview

1. Do you have any views on prioritisation for exploring new data sources for WIMD 2019 as described in section 2.1 point C?

Income domain

2. Do you have any comments on the key proposal for an income deprivation indicator in line with previous indices, based on 2016-17 data, for WIMD 2019?
3. Would you find it useful to have a similar income deprivation indicator made available separately to allow comparison with small areas in England (2015-16 data)?
4. Do you have any comments on the addition of a second indicator on households in low income (based on ONS research outputs), subject to quality considerations?
5. Do you have any other comments on proposals for the Income domain?

Employment domain

6. Do you have any comments on the key proposal for an employment deprivation indicator in line with previous indices, based on 2016-17 data, for WIMD 2019?
7. Would you find it useful to have a similar employment deprivation indicator made available separately to allow comparison with small areas in England (2015-16 data)?
8. Do you have any other comments on proposals for the Employment domain?

Health domain

9. Do you have any comments on the proposed new indicator on reception class children who are of unhealthy weight?
10. Do you have any comments on a proposed new indicator on chronic conditions?
11. Do you have any comments on a proposed new indicator on mental health?
12. Do you have any comments on the proposed refined mortality indicator on premature mortality?
13. What priority order would you place on developing a measure of unhealthy weight in children, chronic conditions, or mental health for WIMD 2019?
14. Do you have any other comments on proposals for the Health domain?

Education domain

15. Do you have any comments on the proposal to include indicators sourced from the On-Entry Assessments of Pupils in Reception Class data and the Foundation Phase outcomes data?
16. Do you have any comments on the proposed Key Stage 4 attainment indicator?
17. Do you have any comments on our proposed approach to produce the Proportion of people aged 18-19 not entering HE indicator?

18. What priority would you place on developing the following measures: On-Entry Assessments of Pupils in Reception Class, or proportion of people not entering higher education aged 18-19 indicator?
19. Do you have any other comments on proposals for the Education domain?

Access to Services domain

20. Do you have any comments on the proposed new indicator on access to broadband services?
21. Do you have a view on how the indicators on travel times (to key services), and access to broadband services should be weighted together for the overall domain score?
22. Do you have any other comments on proposals for the Access to Services domain?

Housing domain

23. Do you have any comments on our proposals to include a modelled indicator of poor housing quality in the housing domain, if possible?
24. In developing the modelled indicator, do you have any comments on our proposed focus on hazards (as defined in the Housing Health and Safety Rating System, HHSRS) and on disrepair to capture poor housing quality?
25. Do you have any comments on our proposal NOT to include an indicator based on Energy Performance Certificate data in the housing domain, based on low data quality?
26. Do you have any comments on our proposal to continue using overcrowding as an indicator of housing deprivation?
27. Do you have any comments on our proposal to drop the “lack of central heating” indicator as a measure of housing deprivation?
28. Do you have any other comments on proposals for the Housing domain?

Physical Environment domain

29. Do you have any comments on our proposals to simplify the air quality subdomain?
30. Do you have any comments on our proposals to include an indicator measuring the lack of proximity to accessible green space instead of the proximity to waste disposal and industrial sites indicator?
31. Do you have any views on the proposed weighting within this domain?
32. Do you have any other comments on proposals for the Physical Environment domain?

Community Safety domain

33. Do you have any comments on proposals for the Community Safety domain?

Weighting of domains

34. Do you have any comments on the proposed approach to weighting domains in WIMD 2019?

Next Steps

35. Do you have any other comments on proposals for WIMD 2019 (not already covered) or future updates of WIMD?

3. Welsh Index of Multiple Deprivation (WIMD) Background

3.1. What does WIMD measure?

WIMD is the Welsh Government's official measure of relative deprivation for small areas in Wales. It is a National Statistic and is produced by statisticians at the Welsh Government. It is designed to identify those small areas where there are the highest concentrations of several different types of deprivation. As such, WIMD is a measure of **multiple deprivation** that is both an **area-based measure** and a measure of **relative** deprivation. These key terms are defined more fully below.

WIMD is currently made up of eight separate domains (or types) of deprivation:

a) Income
b) Employment
c) Health
d) Education
e) Access to Services
f) Community Safety
g) Physical Environment
h) Housing

Each domain is compiled from a range of different indicators. Further information on the methods used in compiling the index are provided in Annex A.

Deprivation is the lack of access to opportunities and resources which we might expect in our society. The domains listed above relate to both material and social aspects of deprivation. Material deprivation is having insufficient physical resources - food, shelter, and clothing – necessary to sustain a certain standard of life. Social deprivation refers to the ability of an individual to participate in the normal social life of the community.

Multiple Deprivation refers to more than one type of deprivation. An area is multiply deprived if, for more than one of these domains, the area has a concentration of people experiencing that type of deprivation. Generally speaking, the greater the number of domains for which there are high concentrations of deprivation then the greater the overall deprivation in an area. This does not necessarily mean that the *same* people suffer multiple types of deprivation in the area, although we would expect there to be significant overlap.

Area-based measure: WIMD is calculated for all Lower layer Super Output Areas (LSOAs) in Wales. Following the 2011 Census, 1909 LSOAs were defined in Wales and they have an average population of 1,600 people. Further information on LSOAs are provided in Annex B. WIMD is based on indicators that consider the aggregate characteristics of the people living in the area as well as in some cases the characteristics of the area itself (for example the physical environment domain).

Relative measure: The Index provides a way of identifying areas in the order of least to most deprived. It does not provide a measure of the level of deprivation in an area but rather whether an area is more or less deprived relative to all other areas in Wales; so we can know which areas are more (or less) deprived than others, but not by how much. The reason for taking such an approach is that this allows the different domains to be combined together.

Index: An index is a group of separate measurements which are combined into a single number. They are designed to show changes in a complicated variable like industrial output, prices or in this case deprivation. An index then allows comparisons between different values – in the case of WIMD, the comparison is between small areas. WIMD ranks all small areas in Wales from 1 (most deprived) to 1,909 (least deprived).

3.2. How the Index is constructed

The Index has three main components:

- The Index itself, which is a set of ranks;
- The ranks of the eight types of deprivation, or domains, from which the overall Index is constructed; and
- The underlying indicators, which are directly measurable, and which are combined to create the domain ranks. Many, but not all, of the indicators are produced as rates. The units depend on what is being measured.

All of these components are calculated for each of the small areas in Wales. The overall 2014 WIMD ranks and the ranks of the eight domains of deprivation are published on the StatsWales website. Where available, the underlying indicator data is published annually on StatsWales. This indicator data can sometimes be used to monitor change over time. More detailed information on the methodology can be found in Annex A.

3.3. What can WIMD be used for?

WIMD can be used for:

- Comparing overall deprivation ranks for all small areas or for a group of them (like those in a Local Authority), so that the small areas can be put in order from the most deprived to the least;
- Comparing ranks within the separate domains of deprivation for small areas;
- Comparing two or more local authorities (or other groups of aggregated small areas) by looking at the proportion of the small areas in the Local Authority in the most deprived (say) 10% in all of Wales;
- Although a ranking system such as WIMD cannot be used for monitoring change over time, it is sometimes possible to analyse change over time by looking at the underlying indicator data (published on StatsWales).

Government programmes – national and local – aiming to tackle deprivation often use WIMD to target funding to the most deprived areas. It is used widely by local authorities, other public bodies, the voluntary sector, academics and students, and the private sector. Some of its known uses are listed below.

Examples of the use of WIMD within National and Local Government:

- Targeting policies such as Flying Start, and Communities for Work
- Deciding on pilot areas or location of strategic hubs
- Calculation of school families, and contextual value added models
- Analysis of the effect of deprivation, including measuring health inequalities
- Project applications and funding bids, including to the Wales European Funding Office
- Evidence base for Regeneration plans and National Development Framework
- Needs assessments including Public Service Boards Assessments of local wellbeing
- Housing renewal initiatives
- Local area profiles for council members
- Evidence for Children and Young People's partnerships, Community Safety Partnerships

Examples of the use of WIMD by other organisations and individuals:

- Public Health Wales – as part of the Public Health Outcomes Framework
- Higher Education Funding Council for Wales – for widening access
- Office for National Statistics – to analyse avoidable mortality by deprivation
- Home Office – to model demands on police forces
- Police Forces and Fire and Rescue Services – to plan neighbourhood resourcing, and community activities
- OFWAT and water companies – to analyse deprivation and levels of water debt
- Health Visitors – to assess the effectiveness of health interventions
- Clinical lecturers – to analyse the effects of deprivation on epilepsy, cystic fibrosis and other illnesses
- Various charities and networks - to highlight deprivation, for funding bids and targeting
- RSPCA – to analyse patterns in animal welfare, deprivation and supporter activity
- Lottery Fund – to allocate funds

3.4. Limitations of WIMD

It is important to remember that WIMD is not the only way to measure deprivation. WIMD has been developed for a particular purpose which is to measure concentrations of deprivation at a small area level.

Deprived individuals: There can be individuals in deprived areas that would not be considered deprived; and there can also be individuals that would be considered deprived in the least deprived areas. Around 1 in 5 of the people in income benefit households live in the most deprived 10 per cent of areas in Wales. This means that although it is true to say that deprivation is much more concentrated in some areas than others, 4 out of 5 people in income benefit households live outside these areas. This is important to remember when targeting resources, as targeting those 'most deprived' areas leads to some households in those areas who may not be deprived being included and many deprived households living in less deprived areas missing out.

Individuals who are deprived in several ways: WIMD does not identify individuals who are deprived in several ways, rather, it identifies areas where there are concentrations of several different types of deprivation. At present, we are not able to link the data included in the Index at an individual person level in order to understand the extent of multiple deprivation for individuals.

Absolute deprivation: WIMD doesn't give a measure of the amount of deprivation in an area, for example it does not allow for statements such as "area A is twice as deprived as area B". The ranks and scores can only be used to say "area A is more deprived than area B". This also means that even if an area's rank remains the same in successive WIMD publications, the level of deprivation in that area could have gone up or down but just not enough to affect the comparison with other areas. However, the analysis of the individual indicators within WIMD does allow for such comparisons between areas and over time.

Poverty: Poverty usually means a lack of money, whereas deprivation includes a lack of the opportunities and resources to which we might expect to have access in our society, for example, good health or a safe living environment.

Affluence: It is important to remember that a lack of deprivation is not the same as affluence. The least-deprived area is not necessarily the most affluent area in Wales. This also means that the ability of WIMD to discriminate effectively between areas is strongest for the most deprived areas and extreme care should be taken in drawing conclusions about the differences between less deprived areas.

Deprivation across the UK: Ranks and Scores are not comparable with the Indices of Multiple Deprivation (IMD) from the other UK countries. Further information on the issue of comparing IMDs across the UK can be found on the archived Neighbourhood Statistics webpage.

Comparisons over time: As the WIMD is a relative index, it's important not to compare ranks across multiple indices. WIMD indicator data is published annually on StatsWales, where possible, in order to allow some comparison over time.

4. Development of Proposals for WIMD 2019

4.1. Reviewing Indicators for WIMD 2019

There are three over-arching groups shaping plans for WIMD 2019. A Steering Group of mainly senior Welsh Government policy officials sets the policy direction. A Project Board of senior analysts oversee the plans, production and dissemination. A mainly external Advisory Group provides expert advice on proposals. Information on WIMD 2019 group membership is provided at Annex C.

To take forward the task of considering indicators for WIMD 2019, seven separate domain working groups have been established:

- Income & Employment
- Education
- Health
- Access to Services
- Community Safety
- Physical Environment
- Housing

Each domain working group includes analytical experts from the Welsh Government, local authorities, other public bodies (e.g. National Resources Wales, Public Health Wales) and academics along with policy representatives from the Welsh Government where appropriate. Full membership is at Annex C.

The domain groups' role is to:

- review and develop indicators for the domain
- respond to feedback from consultations on the indicators
- ensure all indicators are fit-for-purpose
- agree an approach for dealing with any data anomalies or missing data
- advise on technical guidance on the construction and use of the indicators, for inclusion in final reports

The domain groups have been asked to ensure that proposed indicators met the indicator criteria list described below wherever possible.

In 2016 a suite of national indicators was laid before the National Assembly for Wales as required under the Well-being of Future Generations Act (Wales) 2015. Their aim is to assess national progress towards achieving the seven well-being goals put in place by the same Act. Their purpose is, therefore different to that of indicators underlying an index of deprivation. Many of the national indicators are survey-based or otherwise do not lend themselves to measurement at a small area level. However our work to develop indicators for WIMD 2019 included consideration of the national indicators, and we make reference to this where relevant in Section 5, for example on low birth weight and on air quality.

4.2. Indicator Criteria

Indicators included in WIMD should meet a number of criteria to ensure their accuracy and relevance in measuring deprivation, as described below.

a) Each indicator chosen should be relevant to an area based measure of concentrations of deprivation (as defined for the purposes of WIMD). Wherever possible it should relate to an 'enforced lack'[1].

b) Each indicator chosen should be included in one of the agreed domains of deprivation only.

c) Within domains, wherever possible, indicators should be chosen that represent major features of that form of deprivation rather than deprivation affecting a very small number of people or areas. This allows the degree of deprivation to be identified as opposed to a simple 'present/not present' approach.

d) Indicator data should be available at small area level and collected on a consistent basis for the whole of Wales.

e) Indicators should be statistically robust at the small area level. Where cases or incidences are low, aggregates over longer time periods should be included to ensure indicators are not dominated by one-off or uncharacteristic events.

f) Indicator data should be able to be updated on a regular basis and should be as up-to-date as possible. (Although it's not possible to compared WIMD over time, some indicator data are published on an annual basis).

g) Ideally, indicators within each domain should be direct measures of that form of deprivation. Where there are insufficient direct measures, good proxy measures can be used (e.g. although the data from administrative systems are not always direct measures of deprivation, they are often excellent proxies, and have the benefit that they allow the calculation of detailed small area statistics).

h) Modelled measures should only be used in conjunction with a good range of non-modelled indicators. The form of modelling should try to ensure that changes over time are reflected in the modelled variable.

i) Indicators should adhere to the expected properties of a good performance indicator e.g. if there are real changes over time, that these are reflected in the indicators; any changes in the indicator can be explained.

The purpose of the indicators is to collectively provide the best possible measure of concentration of deprivation. Our aim is to identify the optimum number of indicators to help achieve this. The more indicators involved, the more complex the Index becomes.

The set of indicators underlying WIMD does not need to be exhaustive in terms of reflecting all aspects of deprivation. So in addition to the above criteria, we will assess (often using factor analysis) whether a specific indicator within a domain will add enough new information to justify its inclusion alongside the other domain indicators.

A new indicator may turn out to be closely related to an existing one, with similar areas showing similar amounts of deprivation according to those two indicators. In such cases we would consider excluding one of those indicators from WIMD, to achieve the optimum number of indicators without over-complicating the Index.

[1] An enforced lack arises when a person cannot acquire a good or service because they don't have the financial or other means to do so.

5. Domain and Indicator Proposals

The following sections provide a summary of the current proposals for each of the eight domains as well as a list of the consultation questions. We welcome responses to some or all of these questions.

For each domain, the indicators used in WIMD 2014 were reviewed alongside indicators that were considered as part of the WIMD 2014 consultation but subsequently rejected. Potential new indicators were also discussed. Full technical information on the existing indicators is available in the WIMD 2014 Technical Report.

5.1. Income

The income domain focuses on the proportion of people with income below a defined level.

5.1.1. Overview of proposals

The introduction of Universal Credit has a significant impact on the measurement of the income domain of WIMD. We propose to use data at a point in time before the start of rollout of Universal Credit full service in Wales (therefore the 2016-17 financial year) in WIMD 2019. This does not impact much on the currency of the data compared to previous indices.

We will continue to work with the Department for Work and Pensions (DWP) on options for a suitable indicator using data on Universal Credit claimants in future indices.

However, we are also keen to explore new research outputs on income from the Office for National Statistics (ONS), which are based on linked administrative data. We hope to develop an indicator on households with low income for inclusion in WIMD 2019 alongside the existing indicator. Its weight would depend on completeness and robustness of the data that are available before the publication of WIMD 2019.

Note that, due to the impact of Universal Credit, the continued publication of **annual indicator data** on income deprivation is unlikely to be possible, pending the outcome of development work described above. We are aware of significant user need for these updates, and will continue to explore the options available.

5.1.2. WIMD 2014 Indicator

For WIMD 2014 the Income domain consisted of a single composite indicator, Income deprivation, calculated from the following three elements:

a) Income related benefit claimants; this includes Income Support claimants, Jobseeker's Allowance claimants, Pension Credit claimants, and Income Based Employment and Support Allowance claimants; and their dependent children. Sourced from DWP.

b) The number of children and adults within families that are in receipt of Working Tax Credits and Child Tax Credits with an income which is less than 60 per cent of the median income for Wales (Before Housing Costs). Sourced from Her Majesty's Revenue & Customs (HMRC).

c) Supported Asylum Seekers i.e. those who were supported under Section 95 of the Immigration and Asylum Act, and their dependent children. Sourced from the Home Office.

Within DWP datasets the above are counts of unique individuals (i.e. those who claim multiple benefits are only counted once). The indicators are summed and expressed as a percentage of the total population for the LSOA. The resulting composite indicator is a cross-sectional snapshot of people in income deprivation, measured by receipt of certain income-related benefits or tax credits.

Full technical information on the indicator is available in the WIMD 2014 Technical report.

5.1.3. Universal Credit

Universal Credit is replacing most benefits and tax credits inputting to this domain. Once Universal Credit is fully rolled out in all areas, those areas become directly comparable and can be ranked against one another even if eligibility conditions and levels of benefit differ from those relating to benefits currently within WIMD.

However, given the spatially variable and lengthy timescale of implementation, differences between Universal Credit and legacy benefits means we may not be comparing like with like at a given point during the rollout. It is not currently possible to derive consistent relevant counts of claimants from both the legacy system and Universal Credit system. For example because of:

- Housing Benefit, which was not part of our income domain, being included in the list of benefits being replaced by Universal Credit, and the inability to isolate this from other parts of Universal Credit (for datasets on individuals);
- Different eligibility criteria and equivalent income received under the old and new systems, along with any impact of the new process for making claims on take-up.

“Full rollout” started in some Welsh local authorities in April 2017, extending Universal Credit to claimants beyond the previous group of mainly single, new claimants of Job-Seekers Allowance. Due to the geographical nature of the rollout the validity of ranking small areas based on rates of claimants measured after April 2017 is likely to be significantly affected.

There has been a recent announcement that the target completion date for rollout of Universal Credit has been extended to March 2023. This would mean the next Index after 2019 is likely to encounter similar issues of a mixed picture between legacy benefits and Universal Credit claimants.

A recent National Audit Office report on Rolling out Universal Credit describes evidence from local and national bodies that many people have suffered difficulties and hardship during the roll out of Universal Credit. The report states that it is not currently possible to quantify how many claimants are experiencing difficulties with Universal Credit or experiencing hardship as a result. Therefore we are currently unable to consider such an indicator for inclusion in WIMD 2019.

5.1.4. Proposed indicator

Although rollout of Universal Credit full service did not begin in Wales until April 2017, there had previously been rollout of Universal Credit to (mainly) single, new claimants of Job-Seekers Allowance. For our 2016 and 2017 indicator updates, we worked with DWP to add in relevant claimants to our published indicators, which was possible as these were relatively straightforward to map to the old/legacy system indicators. We published information on this in our guide to analysing indicator data.

The main indicator we propose to use for WIMD 2019 is the latest possible update to the 2014 indicator (with early, straightforward, cases of Universal Credit claimants included as mentioned above), based on a reference period of 2016-17. We propose that the income domain will consist of a single composite indicator calculated from the following four elements:

a) Income related benefit claimants; this includes Income Support claimants, Jobseeker's Allowance claimants, Pension Credit claimants, and Income Based Employment and Support Allowance claimants; and their dependent children. Sourced from DWP.

b) The number of children and adults within families that are in receipt of Working Tax Credits and Child Tax Credits with an income which is less than 60 per cent of the median income for Wales (Before Housing Costs). Sourced from HMRC.

c) Supported Asylum Seekers i.e. those who were supported under Section 95 of the Immigration and Asylum Act, and their dependent children. Sourced from the Home Office.

d) People on Universal Credit and their dependent children. We exclude those who are "working with no requirements" according to the dataset's "conditionality" marker. Sourced from DWP.

Within DWP datasets the above are counts of unique individuals (i.e. those who claim multiple benefits are only counted once). The different elements will be summed and expressed as a percentage of the total population for the LSOA.

5.1.5. Current development work

Indicator consistent with English IMD

In the past our counterparts in UK government have included a similar income deprivation indicator in the English Index of Multiple Deprivation (IMD). There have been some differences between the Welsh and English indicators, and there are elements of the English method that are preferable to the Welsh. For example an additional step to de-duplicate between DWP benefit and HMRC tax credit data (as well as within DWP benefits), and the inclusion of non-claiming partners of claimants in the English data.

There is also considerable user interest in consistent data on deprivation for small areas across England and Wales. Because of this, officials from the Ministry of Housing, Communities and Local Government (MHCLG) who are working on the English IMD 2019 update are exploring the option of extending the scope of their DWP and HMRC data request for their Income domain to include Wales (Welsh LSOAs). However the overall English IMD 2019 ranks would not cover Wales.

This would lead to a consistent set of England and Wales income deprivation indicators for LSOAs, and some methodological improvement compared to the existing WIMD indicator. However the reference point for the data will be 2015-16, since rollout of Universal Credit full service began during 2016-17 in England. This data is likely to become available in early 2019, and at that point we will assess the impact of the different approach on the income deprivation indicator for Welsh areas.

We have not yet ruled out, but do not anticipate using indicator data from the English approach as a direct input to WIMD 2019. This is because the data is a year older than what we propose to use, would not come with as full a range of age breakdowns, and would not be as comparable with previous WIMD data. However it is likely to be a useful additional tool for those working on deprivation issues across England and Wales, and we would work with MHCLG to ensure availability of the data for users.

Income distribution research outputs

The ONS have produced small area (LSOA) income distribution research outputs as part of work on the Administrative Data Census. They incorporate data on income from the Pay As You Earn (PAYE), benefits and tax credits systems. The latest publication gives LSOA level data on proportion of people and households in certain income bands for the tax year 2015/16.

At present a number of components are missing from the underlying sources of income, for example data on earnings from self-employment (Self-Assessment data), and data on income from Student Loans and Grants. ONS officials are working with data providers to fill some of these gaps. If Self-Assessment data is incorporated into the source by spring 2019 we will assess the data quality and suitability for inclusion in WIMD 2019, including the impact of students on the indicator in certain areas. If data is not appropriate for WIMD 2019, we will keep this under close review for future Index updates.

The inclusion of PAYE and Self-Assessment data would allow us to capture those on low incomes who are not claiming benefits or tax credits, making this a potentially valuable addition to the domain. There would also be scope to publish updated indicator data in-between indices.

The type of indicator we are considering is the proportion of households in an area with income below a threshold amount. We propose analysing households rather than individuals as this would adjust income for the presence of other household members (e.g. children) through an equivalisation process. The Northern Ireland Multiple Deprivation Measure used a similar database of household incomes to derive its income domain in 2017. There is also a national indicator for Wales on the percentage of people living in households in income poverty relative to the UK median. Whilst measured from a different (survey) source at national level, it is a similar concept to that we intend to explore.

5.1.6. Future development work

We will continue to work with DWP to consider how to further incorporate Universal Credit into the Index for future iterations, as the development of new Universal Credit statistics continues. DWP have recently consulted on the official statistics they produce on the Universal Credit system, and published a statistics release strategy, which provides an indication of future data that may become available. They have also consulted on proposals for a new statistical series to count unemployed claimants.

The ONS currently produces small area model-based income estimates, modelled down to Middle-layer Super Output Area (MSOA) level from survey estimates. These are currently unavailable at the LSOA level, but we will continue to monitor any developments.

5.1.7. Weighting

In the past only one indicator has been included in the domain. If we develop a robust indicator on households with low income for inclusion alongside the existing indicator, their respective weights would be depend on our assessment of the quality of data underlying the new indicator. We expect this would be given a lower weighting (compared to the existing indicator) for WIMD 2019.

5.1.8. Issues for response

- Do you have any comments on the key proposal for an income deprivation indicator in line with previous indices, based on 2016-17 data, for WIMD 2019?
- Would you find it useful to have a similar income deprivation indicator made available separately to allow comparison with small areas in England (2015-16 data)?
- Do you have any comments on the addition of a second indicator on households in low income (based on ONS research outputs), subject to quality considerations?
- Do you have any other comments on proposals for the Income domain?

5.2. Employment

The purpose of the employment domain is to capture lack of employment. This covers involuntary exclusion of the working age population from work, including those people who cannot work due to ill-health or who are unemployed but actively seeking work.

5.2.1. Overview of proposals

The introduction of Universal Credit has a significant impact on the measurement of the employment domain of WIMD. We propose to use data at a point in time before the start of the rollout of Universal Credit full service in Wales (2016-17 financial year) in WIMD 2019. This does not impact much on the currency of the data compared to previous indices.

We will continue to work with the Department for Work and Pensions (DWP) on options for a suitable indicator using data on Universal Credit claimants in future indices.

Note that, due to the impact of Universal Credit, the continued publication of **annual indicator data** on employment deprivation is unlikely to be possible, pending the outcome of development work described above. We are aware of significant user need for these updates, and will continue to explore the options available.

5.2.2. WIMD 2014 Indicator

The employment related benefits indicator in WIMD 2014 was calculated from a count of unique individuals (i.e. those who claim multiple benefits are only counted once) claiming:

- Jobseeker's Allowance (JSA)
- Employment and Support Allowance (ESA)
- Incapacity Benefit (and Severe Disablement Allowance)

The indicator is a cross-sectional snapshot of people in employment deprivation, measured by receipt of certain unemployment-related benefits. The indicator is expressed as a percentage of the working-age population (all aged 16-64) for the LSOA, and the source is DWP.

5.2.3. Universal Credit

Universal Credit is replacing most benefits and tax credits inputting to this domain. Once Universal Credit is fully rolled out in all areas, those areas become directly comparable and can be ranked against one another even if eligibility conditions and levels of benefit differ from those relating to benefits currently within WIMD.

However, given the spatially variable and lengthy timescale of implementation, differences between Universal Credit and legacy benefits means we may not be comparing like with like at a given point during the rollout. It is not currently possible to derive consistent relevant counts of claimants from both the legacy system and Universal Credit system. For example because of:

- Different eligibility criteria under the old and new systems, along with any impact of the new process for making claims on take-up;
- Inability to separate out individuals not working due to ill-health (part of the employment domain) in the data on Universal Credit.

“Full rollout” started in some Welsh local authorities in April 2017, extending Universal Credit to claimants beyond the previous group of mainly single, new claimants of Job-Seekers Allowance. Due to the geographical nature of the rollout the validity of ranking small areas based on rates of claimants measured after April 2017 is likely to be significantly affected.

There has been a recent announcement that the target completion date for roll-out of Universal Credit has been extended to March 2023. This would mean the next Index after 2019 is likely to encounter similar issues of a mixed picture between legacy benefits and Universal Credit claimants.

5.2.4. Proposed indicator

Although rollout of Universal Credit full service did not begin in Wales until April 2017, there had previously been rollout of Universal Credit to (mainly) single, new claimants of Job-Seekers Allowance. For our 2016 and 2017 indicator updates, we worked with DWP to add in relevant claimants to our published indicators, which was possible as these were relatively straightforward to map to the old/legacy system indicators. We published information on this in our guide to analysing indicator data.

The main indicator we propose to use for WIMD 2019 is the latest possible update to the 2014 indicator (with early, straightforward, cases of Universal Credit claimants included as mentioned above), based on a reference period of 2016-17. The employment domain will consist of a count of individuals (i.e. those who claim multiple benefits are only counted once) entitled to:

- Jobseeker's Allowance (JSA)
- Employment and Support Allowance (ESA)
- Incapacity benefit (and Severe Disablement Allowance)
- Universal Credit (UC) and not in employment

The indicator is expressed as a percentage of the working-age population for the LSOA, and the source is DWP.

5.2.5. Current development work

Indicator consistent with English IMD

In the past our counterparts in UK government have included a similar employment deprivation indicator in the English Index of Multiple Deprivation (EIMD), but including Carer’s Allowance. The inclusion of Carer’s Allowance in the WIMD employment domain was considered for WIMD 2014, but not incorporated to minimise changes to the domain ahead of the advent of Universal Credit. There is also a small difference between the indicators in terms of the definition of working age used in the denominator, with WIMD using 16-64 and EIMD using women aged 18 to 59 and men aged 18 to 64.

There is considerable user interest in consistent data on deprivation for small areas across England and Wales. Because of this, officials from the Ministry of Housing, Communities and Local Government (MHCLG) who are working on the English IMD 2019 update are exploring the option of extending the scope of their DWP data request for their Employment domain to include Wales (Welsh LSOAs). The overall English IMD 2019 ranks would not cover Wales.

This would lead to a consistent set of England and Wales employment deprivation indicators for LSOAs. However the reference point for the data will be 2015-16, since rollout of Universal Credit full service began in 2016-17 in England. This data is likely to become available in early 2019, and at that point we will assess the impact of the different approach on the employment deprivation indicator for Welsh areas.

We do not propose to use indicator data from the English approach as a direct input to WIMD 2019. This is because the data is a year older than what we propose to use, would not come with as full a range of age breakdowns, and would not be as comparable with previous WIMD data. However it is likely to be a useful additional tool for those working on deprivation issues across England and Wales, and we would work with MHCLG to ensure availability of the data for users.

5.2.6. Other considerations

Job quality and fair work

Employment domain group discussions have covered the concepts of job quality and fair work, as important aspects of employment deprivation. However we are not aware of any relevant data available at the small area level at present.

Labour Market research outputs

The ONS have produced new labour market research outputs as part of work on the Administrative Data Census. The aim is to produce small area, multivariate statistics, and they have published data on labour market status by local authority for tax year 2011/12. They mainly draw on Jobseekers Allowance data, an existing component of our proposed indicator. We will monitor this development work ahead of future iterations of the Index.

We will continue to work with DWP to consider how to further incorporate Universal Credit into the Index for future iterations, as the development of new Universal Credit statistics continues. DWP have recently consulted on the official statistics they produce on the Universal Credit system, and published a statistics release strategy, which provides an indication of future data that may become available. They have also consulted on proposals for a new statistical series to count unemployed claimants.

5.2.7. Weighting

Our proposal is for only one indicator to be included in the domain.

5.2.8. Issues for response

- Do you have any comments on the key proposal for an employment deprivation indicator in line with previous indices, based on 2016-17 data, for WIMD 2019?
- Would you find it useful to have a similar employment deprivation indicator made available separately to allow comparison with small areas in England (2015-16 data)?
- Do you have any other comments on proposals for the Employment domain?

5.3. Health

The purpose of this domain is to measure lack of good health. This domain does not contain any sub-domains. Some indicators in this domain are age-sex standardised to account for population differences across small areas.

5.3.1. Overview of Proposals

We've chosen to present the proposed indicators in three categories below:

- Indicators that are related to children
- Indicators that capture specific diagnosed conditions
- Indicators that capture broader population health status

This helps to illustrate the range of data sources being considered, which in turn helps to ensure the array of health problems that affect members of our society are captured in this domain. Some of the proposed indicators are unchanged from the previous index whilst others are refined. Full technical information on the existing indicators is available in the WIMD 2014 Technical Report.

There is a great deal of ongoing development underway for the health domain, which we hope will lead to a fuller picture of health for small areas in Wales for WIMD 2019. Many proposals are still early work in progress, and as yet light in detail. We will elaborate on new indicators to be taken forward in our report on consultation responses in spring 2019.

A summary of our proposals under each heading follows, with more detail in section 5.3.2.

- Indicators that are related to children
    - We propose to supplement a measure of birth weight with a new measure on reception class children who are of unhealthy weight
- Indicators that capture specific diagnosed conditions
    - We hope to expand the range of indicators from cancer incidence alone, to include a suitable measure of chronic conditions and of mental health
- Indicators that capture the status of the populations health more broadly
    - We plan to retain a self-reported measure of limiting long-term illness, and refine the mortality measure to focus on premature deaths

5.3.2. Proposed indicators

Indicators that are related to children

Low Birth Weight (LBW)

Birth weight is inversely associated with infant mortality, life expectancy, and is predictive of disability and educational achievement as well as diabetes, stroke and heart disease in adults. The percentage of live single births less than 2.5kg (5.5lbs) was included in WIMD 2011 and WIMD 2014. This data is in line with the low birth weight National Indicator which helps to measure progress against key Well-being Goals in Wales under the Wellbeing of Future Generations Act 2015.

It is likely that we will include low birth weight as described above in WIMD 2019. However, we will be exploring healthy birth weight (appropriate for gestational age, therefore including those large for gestational age as well as small) as an alternative measure to low birth weight.

Children who are of unhealthy weight

A measure of unhealthy weight in children (underweight, overweight or obese) is considered relevant, due to links between unhealthy weight in childhood and in adulthood, leading to longer term health problems. In WIMD 2014 there were insufficient years of data from the Child Measurement Programme (for reception class children) to include such a measure. We have started to explore relevant data from Public Health Wales for WIMD 2019. We have not yet determined the exact categories preferred for inclusion, and will continue to review the data for small areas and evidence on links between childhood weight and future health to aid this decision. We are currently minded to include a measure of obesity on its own, due to:

- small numbers of children in the underweight category;
- research suggesting that children who were classified as being overweight while in reception year were more likely to achieve a healthy weight by Year 4 than those who were classified as obese.

Indicators that capture specific diagnosed conditions

Cancer Incidence

Cancer is a common condition which can have significant and lasting negative impacts on an individual's health and wellbeing. There were 19,088 new cases in Wales in 2015 and there is a long-term trend of increasing numbers in the population. This indicator is the number of people diagnosed with cancer (all malignancies excluding non melanoma skin cancer) per 100,000 people in Wales and is indirectly standardised for the age and sex profile of the population. The data source for this indicator is the Welsh Cancer Intelligence & Surveillance Unit (WCISU). Cancer incidence was included in WIMD 2011 and 2014.

The inclusion of data on the stage of cancer at diagnosis was discussed as a reflection of effective screening, health literacy and access to health services in an area, which could be proxies for wider health deprivation. However, there are currently only four years of data on stage of cancer available, and this does not produce robust figures at LSOA level. This data source will be revisited for the next Index.

Chronic conditions

Nearly all 2014 consultation respondents agreed that an indicator measuring prevalence of particular diagnosed chronic conditions (e.g. coronary heart disease, diabetes) recorded by GP surgeries would be a valuable addition. The recent Public Health Wales report on Health and its determinants in Wales outlines the main causes of death, disability and illness which make up the picture of health in Wales. If we succeed in gaining access to suitable data, we would refer to this work (alongside data on numbers of people affected) in deciding which conditions to focus on and aggregate together to provide a single indicator of the prevalence of chronic conditions.

The Quality and Outcomes Framework (QOF) is a system for GP practices to maintain registers for different conditions. The system was introduced in 2004 and whilst it is voluntary, all practices in Wales participated in 2016-17. Data is currently available and routinely published at GP practice level. We are currently investigating whether we can

gain access to this data at LSOA level (based on patient residence) from NHS Wales Informatics services (NWIS).

If we are able to access this data we will explore its quality and consistency before deciding whether it is appropriate for inclusion in WIMD 2019. For example, the way in which certain conditions are recorded across GP surgeries may vary, particularly as the system is non-mandatory.

Mental Health

We would like to include an indicator of mental health in WIMD 2019. Mental health based indicators are included in the indices of deprivation for all three other UK nations. Mental health is also a priority area in the Welsh Government's National Strategy Prosperity for All. We have focussed our research on two key sources which may provide indicators of the prevalence of mental health conditions at a small area level.

England, Scotland, and Northern Ireland have included prescriptions data within a mental health indicator, to estimate the proportion of the population being prescribed drugs for particular mental health conditions, such as depression and anxiety. One argument against this approach is the likely variation in propensity to prescribe certain medications across GP practices, e.g. in some areas there has been lots of work to encourage social prescribing for certain mental health conditions. Also, we are currently unable to access LSOA data aggregated from an individual level (dispensing data which includes patients' demographic information) due to barriers to data access. There are a number of issues with the alternative approach of accessing available GP practice level data on prescribed drugs:

- the need to make inferences about the number of people being prescribed medications (the data only tells us about the number of prescriptions written).
- the need to apportion GP practice level data down to LSOA level, when practices often have very large catchment areas of around 100-250 LSOAs.

The Quality and Outcomes Framework (QOF) data (described in detail in the previous sub-section) include information from GP registers about certain diagnosed mental health conditions such as depression. If we are able to access the data at LSOA level (based on patient's home address), our preference is to use QOF data to derive an indicator based on GP registers of mental health conditions. There are a number of other issues that will need to be explored before deciding whether QOF data on mental health is appropriate for inclusion in WIMD 2019.

Indicators that capture the status of the population's health more broadly

Long Term Limiting Illness

The number of people per 100,000 with a limiting long-term illness was included in WIMD 2014 and is sourced from the 2011 Census, Office for National Statistics (ONS). A limiting long-term illness covers any long-term illness, health problem or disability that limits daily activities or work.

Since it is Census-based, the data would be the same as that used for WIMD 2014. However we propose to retain the indicator because it differs from others described above through being a self-reported measure of the whole population. It may on the one hand capture those in ill-health who do not appear in the health service records described, and on the other hand omit those (captured in other indicators) who do not view themselves to be limited in their daily activities.

Mortality Data

The all-cause death rate, or number of deaths per 100,000 people, was included in WIMD 2011 and WIMD 2014 as a proxy for morbidity. Following analysis of data on mortality, we are proposing to use an indicator on the all-cause rate of deaths for those that are under the age of 75, the **premature death rate,** instead of the previous indicator. We will explore how best this should be standardised to the age and sex profile of the population. The data source is the Office for National Statistics (ONS).

Our view is that the premature mortality measure is more sensitive to poor health that is manifest through lower life expectancy and so would be more relevant to health deprivation in a population. We initially considered avoidable mortality as an option for inclusion (see below) but after exploration of the data found measures of premature death to be more robust at small area level without impacting on the relevance or relationship to health deprivation. The relationship between avoidable mortality data and premature death rate data is very strong.

Avoidable mortality means deaths from causes that are considered avoidable in the presence of timely and effective healthcare or public health interventions. This concept was considered for inclusion in WIMD 2019 because it is more strongly related to deprivation than deaths from all causes. However, as well as lacking robustness at a small area level, avoidable mortality is quite a complex concept to define and is somewhat subjective which makes it less desirable for inclusion in WIMD, relative to the premature death rate.

5.3.3. Indicators to consider for the future

Child health and wellbeing Indicator

We have considered deriving an indicator measuring the wellbeing of children from data collected through the School Health Research Network (SHRN), which covers a number of health, wellbeing or lifestyle related topics. From autumn 2017 all schools participated in this research network with around 100,000 children mostly aged 11 to 16 years old being included in the measures. There is potential for participant data to be linked to PLASC data which would allow LSOA estimates to be derived, an approach which is currently being piloted. We will continue exploring how we could use this data as a WIMD health indicator and this is something that will be considered for a future index.

Stage of Cancer at Diagnosis

Please see section 5.3.2.

5.3.4. Rejected indicators

Maternity Indicators - breastfeeding

Whilst breastfeeding has a range of benefits to both babies and mothers, it is felt that it is not suitable for inclusion as an indicator in the WIMD because of:

- Data quality: There are a number of missing records for babies who are breastfed at birth. To allow us to produce LSOA estimates we would need several years of data, and whilst quality is improving, there is not sufficient data to allow us to produce a robust indicator.
- The inclusion of low birth weight: Whilst breastfeeding has benefits, low birth weight is a better predictor of a range of health and educational factors so is preferred for inclusion.

Proportion of Unpaid Carers

In the lead up to 2014, it was suggested that we consider including a measure of unpaid care levels from the Census, to capture possible health deprivation of the carer. However, the ill-health of carers would be captured through other indicators, and a separate indicator would need to be sourced from Census 2011 data. The group agreed not to pursue for WIMD 2019 for the reasons above and those provided in 2014.

Emergency stays in hospital

England, Scotland and Northern Ireland have all included a measure involving emergency stays in hospital. This indicator has been suggested as a measure for poor primary care and preventative healthcare. In the past we have decided against its inclusion on the basis that it may measure lack of supply as opposed to poor health, there may be operational variations between and within emergency departments (e.g. if different staff are working at different times) and issues with proximity (e.g. different admission rates for urban/rural areas). We do not propose to pursue this for inclusion in WIMD 2019.

Potential years of life lost

Another way to consider mortality is through an indicator that measures the potential years of life lost. However, this concept relates closely to the simpler and more robust premature mortality rate, and will not be considered further for inclusion in WIMD 2019.

Healthy Life Expectancy

Healthy life expectancy may be of particular importance given the aging population. However, data is not considered to be robust at LSOA level and would most likely be reliant on 2011 Census-based prevalence information. The data at Local Authority level can be sourced from the ONS.

All-cause death rate
Please see section 5.3.2.

Avoidable mortality
Please see section 5.3.2.

5.3.5. Other developments

Secure Anonymised Information Linkage (SAIL) databank

We are exploring the possibility of deriving health indicators through accessing linked data available in the SAIL databank (which is supported by Swansea University). This could include data on chronic disease, emergency stays in hospital, childhood obesity and mental health. Even if data is not sourced from the SAIL databank for use in WIMD 2019 it will be a useful tool to validate and check measures that we are considering. For example, referring to proposed indicators above, we hope there will be scope to use the SAIL databank to explore the relationship between prevalence and prescriptions for certain illnesses, to gauge how good a proxy data on prescriptions are for lack of good health.

5.3.6. Weighting

Within the Health domain, factor analysis is used to determine the weightings of the constituent indicators, and we propose to continue with this approach should the additional three indicators be included.

However, it is possible that the factor analysis may assign low weights to some indicators. This will mean that these indicators will not add significant information to the measurement of deprivation in this domain. Therefore, in such instances, we will consider omitting them from the Index.

5.3.7. Issues for response

- Do you have any comments on the proposed new indicator on reception class children who are of unhealthy weight?
- Do you have any comments on a proposed new indicator on chronic conditions?
- Do you have any comments on a proposed new indicator on mental health?
- Do you have any comments on the proposed refined mortality indicator on premature mortality?
- What priority order would you place on developing a measure of children who are of unhealthy weight, chronic conditions, or mental health for WIMD 2019?
- Do you have any other comments on proposals for the Health domain?

5.4. Education

The purpose of this domain is to capture the extent of deprivation relating to education, training and skills. It is designed to reflect educational disadvantage within an area in terms of lack of qualifications and skills. The proposed indicators capture low attainment among children and young people and the lack of qualifications in adults.

The key proposal from The Education (Amendments Relating to Teacher Assessment Information) (Wales) Regulations 2018 consultation was that the Welsh Government will no longer publish teacher assessment data and National Reading and Numeracy Tests data below the national level. This change would apply to the Foundation Phase, Key Stage 2 and Key Stage 3 in all primary and secondary schools maintained by Welsh local authorities.

However, the consultation also stated that data will continue to be proactively published for statistical and other geographies e.g. LSOAs and assembly constituencies, where the purpose, use and focus of the data is not linked to school accountability e.g. to support the production of the Welsh Index of Multiple Deprivation (paragraph 38). Therefore, careful consideration will be given to the presentation of LSOA level education outcomes data in WIMD 2019 outputs but note that, as in previous WIMD releases, indicator data relating to schools will be derived on the basis of pupils' home residence as opposed to the location of the school.

5.4.1. Overview of proposals

We've chosen to notionally group the proposed indicators into three categories below:

- Early years indicators
- School outcomes / absenteeism indicators
- Post-compulsory education / wider population indicators

A summary of our proposals for each category follows, with more detail in section 5.4.2.

- **Early years indicators**
  - We propose to include an indicator sourced from the Welsh Government's On-Entry Assessments of Pupils in Reception Class in order to capture educational development in pre-school years. Early Years is a priority area in the Welsh Government's *Prosperity for All* national strategy.
- **School outcome / absenteeism indicators**
  - We intend to retain the Key Stage 2 average point score and repeat absenteeism indicators from WIMD 2014, develop a new Key Stage 4 average point score indicator and introduce a Foundation Phase average point score indicator sourced from outcomes data at the end of year 2.
- **Post-compulsory education / wider population indicators**
  - We plan to retain the proportion of people not entering higher education aged 18-19 and number of adults aged 25-64 with no qualifications indicators from WIMD 2014. However, we intend to explore potential alternative data sources for the former indicator.

5.4.2. Proposed indicators

On-Entry Assessments of Pupils in Reception Class indicator (three year average) – This indicator was not included in WIMD 2014. It would be based on teacher assessments conducted during the first 6 weeks of school and would measure educational disadvantage in pre-school years. The data source for this indicator is the On-Entry Assessments of Pupils in Reception Class Data collected by Welsh Government. This data is also used to produce National Indicator 6 (*Measurement of Development of Young Children*). It is anticipated that this indicator will be derived on an average point score basis to align with the school outcomes measures detailed below.

Foundation Phase Average Point Score (three year average) – This indicator was not included in WIMD 2014 but is proposed for inclusion in WIMD 2019. It is based upon the results of teacher assessments for pupils aged 7 being taught in National Curriculum Year Group 2 (i.e. end of Foundation Phase). It is not statutory for independent schools to provide this data so they are not included. This indicator will complement the Key Stage 2 Average Point Score indicator (see below) to measure educational deprivation at primary school level. The data source for this indicator is the Pupil Level Annual School Census (PLASC) and National Data Collection (NDC), Welsh Government.

Key Stage 2 Average Point Score (three year average) – This indicator was included in WIMD 2014. This indicator is based upon the results of teacher assessments for pupils aged 11 being taught in National Curriculum Year Group 6 (i.e. end of Key Stage 2). It is not statutory for independent schools to provide this data so they are not included. The data source for this indicator is the Pupil Level Annual School Census (PLASC) and National Data Collection (NDC), Welsh Government.

Key Stage 4 Average Point Score (three year average) – Two indicators of achievement at Key Stage 4 were included in WIMD 2014 (KS4 Capped Points Score and KS4 Level 2 Inclusive). Due to a number of factors including changes to the way achievement is measured at KS4 in Wales, divergence between KS4 measures in England and Wales, and longer term changes to the curriculum arising from Successful Futures; these indicators are no longer appropriate for WIMD 2019.

From September 2019, the Welsh Government will be moving to an updated version of the current 'capped 9' points score to measure achievement at KS4. However, as the aforementioned changes to KS4 measures have been implemented gradually since 2015/16, it is not possible to produce three comparable years of 'capped 9 points' score data for WIMD 2019.

Therefore it is proposed that a stand-alone KS4 indicator is developed. It will consider the grades achieved by year 11 pupils in GCSE English or GCSE Welsh, GCSE Mathematics and GCSE Science (i.e. the core components of the 'capped 9' points score); and derive an indicator based on the average point score calculated from these results. The exact definition for the indicator is yet to be determined, and we are open to views on this. The data source for this indicator is PLASC and the Welsh Examinations Database (WED), Welsh Government and it is available on a consistent basis over time.

The two KS4 indicators included in WIMD 2014 incorporated data from the Department for Education (DfE) relating to Welsh-domiciled year 11 pupils at English schools. We will continue to liaise with DfE to obtain appropriate data to input into this alternative indicator.

Repeat Absenteeism Rate (three year average) – This indicator was included in WIMD 2014. There is a recognised link between absenteeism and attainment. The Welsh Government's definition of a 'persistent absentee' is a pupil missing 20% or more of half day school sessions. However, as in WIMD 2014, this indicator will use a 15% threshold. Previous analysis has indicated that the number of 'persistent absentees' using the 20% threshold is too low for the purposes of calculating an appropriate indicator at small area level. Whereas the number of repeat absentees using a 15% threshold is considerably higher, and research by the Department for Education in England[2] concludes that once a range of pupil characteristics have been controlled for, pupils missing more than 15% of school sessions drop one grade in each of their GCSE, when compared to those that miss less than 15% of school sessions. It is therefore suggested that an indicator on the rate of pupils missing 15% or more of school sessions be used as a proxy for persistent absenteeism for the purposes of WIMD 2019. Data will be based on all pupils of statutory school age attending a maintained school. The data source for this indicator is PLASC, Attendance collection, Welsh Government.

Proportion of people not entering Higher Education aged 18-19 – Whilst a measure of the number of people not in employment, education or training would, conceptually, be a stronger measure of educational deprivation for young people, it is not possible to include this (as detailed on the next page). However, non-continuation to HE may be a reflection of lack of opportunities, and will impact on attainment in higher level qualifications (which is linked to economic activity and salary).

The data source for this indicator in WIMD 2014 was the Participation of Local Areas (POLAR) data developed by the Higher Education Funding Council for England (now the Office for Students (OfS)). However, due to underlying changes in the derivation-methodology, we're informed that the latest release of POLAR data can only be provided at MSOA level. Therefore we have three potential options:

- *Preferred option*: Investigate other potential data sources, for example utilising data-linking methods applied to data already held by Welsh Government.

- *Alternative option 1*: Use the latest POLAR data (POLAR4) which measures those entering higher education between academic years 2009/10 and 2014/15, and simply assign the MSOA level figure to each LSOA situated within it.

- *Alternative option 2*: Reuse the previous POLAR3 data that was used for WIMD 2014 which measured those entering higher education during academic years 2005-06 to 2010-11.

Number of Adults aged 25-64 with No Qualifications – This indicator was included in WIMD 2014. This is the only measure of educational deprivation amongst the adult population. Due to recent changes to the state pension age, this indicator will look at those aged 25-64. This indicator is similar to National Indicator 8 (*Percentage of adults with qualifications at the different levels of the National Qualifications Framework*). However, the data source is the 2011 Census instead of the Annual Population Survey.

[2] DFE-RR171 – A Profile of Pupil Absence in England

5.4.3. Other indicators discussed

National Tests – Initial results from the newly introduced National Reading and Numeracy Tests (for those in years 2-9) were published in August 2013. Therefore it was not possible to include an indicator sourced from this data in WIMD 2014. However, further consideration has been given to whether an indicator sourced from the National Tests could be included in WIMD 2019.

Pupils are only tested on a part of the knowledge and skills that pupils are expected to learn under the National Curriculum and the tests do not therefore provide a rounded picture of the ability of the pupils in the same way that teacher assessments do. Also, they provide a snapshot of a pupil's ability on a single given day of the academic year and many factors that are not related to deprivation can influence the mark achieved in the test on that day.

Further to this, the paper based National Reading and Numeracy Tests are being phased out between 2018 and 2020 to be replaced by on-line adaptive personal assessments. This data will not be collected by the Welsh Government and it will not be possible to include any test data in future releases of WIMD.

Therefore we do not propose the inclusion of an indicator sourced from the National Tests in WIMD 2019.

Young people not in education, employment or training (NEET) – Conceptually, a measure of those not in education, employment or training (NEET) would be a suitable measure of educational deprivation. However, as the number of those who are NEET is collected from a sample survey, and the number of those who are NEET is relatively low, it is not possible to derive an indicator at a small area level. The data can be sourced from the Annual Population Survey.

There is a current Welsh Government programme of work looking at the development of KS4 / KS5 destinations datasets. These datasets are derived by the linking of education data-sources alongside engagement with DfE's Longitudinal Educational Outcomes Study (which aims to link education datasets to employment/earning data from DWP/HMRC) and provide data on where pupils go once they leave compulsory education. This data source will not be ready for WIMD 2019 but we will consider its potential to be used in future WIMD releases.

In the interim, further investigation of the destination dataset collected by Careers Wales is being undertaken to determine whether it could provide a robust, proxy indicator for NEETs.

5.4.4. Weighting

Within the Education domain, factor analysis is used to determine the weightings of the constituent indicators, and we propose to continue with this approach for WIMD 2019.

However, it is possible that the factor analysis may assign low weights to some indicators. This will mean that these indicators will not add significant information to the measurement of deprivation in this domain. Therefore, in such instances, we will consider omitting them from the Index.

5.4.5. Issues for response

- Do you have any comments on the proposal to include indicators sourced from the On-Entry Assessments of Pupils in Reception Class data and the Foundation Phase outcomes data?
- Do you have any comments on the proposed Key Stage 4 attainment indicator?
- Do you have any comments on our proposed approach to produce the Proportion of people aged 18-19 not entering HE indicator?
- What priority would you place on developing the following measures: On-Entry Assessments of Pupils in Reception Class or proportion of people not entering higher education aged 18-19 indicator?
- Do you have any other comments on proposals for the Education domain?

5.5. Access to Services

5.5.1. Background and overview

The purpose of this domain is to capture deprivation as a result of a household's inability to access a range of services considered necessary for day-to-day living. This covers both material[3] deprivation (for example not being able to get food) and social[4] aspects of deprivation (for example not being able to attend after-school activities).

The current measure of the access to services domain is not, like the other seven domains, a direct measure of deprivation that can be used on its own; rather it is a contributory factor that becomes important as an aspect of multiple deprivation. That is, poor access to services is a factor which can compound other types of deprivation that exist in an area.

The domain has historically had a relatively low weighting in the overall deprivation index, but is often used on its own as a measure of sparsity for analysis or to contribute to funding formulae.

In the latest Index the access to services domain measured travel times to 8 services using public transport and 9 services using private transport. Public transport included travel by: public bus, public train, foot and national coach. Private transport was considered to be transport by private car. The inclusion of private transport in the indicators was new for WIMD 2014.

The travel time indicators were weighted averages of the private and public transport times to each service (with the exception of petrol stations). The weights were calculated for each small area using data from the 2011 Census on car ownership and the number of adults aged 17 and over. Factor analysis was used to combine the resulting indicators for each service.

As it stands, the domain currently only covers limited service accessibility issues, for example, it doesn't consider whether the journey could be made at any time, the quality of the service, or whether the service could be accessed without travelling (through the internet, phone, post).

For WIMD 2019 we are proposing to introduce a separate measure of access to superfast broadband services into the domain, which has been highlighted as a priority by several users during and since the consultation for WIMD 2014. This is subject to a review of new coverage data to be released by Ofcom in 2019. If available measures do not provide enough variation to reliably rank areas, we may be unable to include such an indicator for WIMD 2019, but will review the situation as digital services and coverage datasets evolve.

[3] Material deprivation is having insufficient physical resources - food, shelter, and clothing – necessary to sustain a certain standard of life.
[4] Social deprivation refers to the ability of an individual to participate in the normal social life of the community.

5.5.2. Proposed indicators

The description of proposed indicators below is split into two parts:

A. Services where we will measure travel time for physical access

B. New proposals for measuring access to broadband services

A. Services where we will measure travel time for physical access

Our proposal is to implement minimum change to the list of services that we measure travel time to, compared to WIMD 2014. For this iteration of the Index we will instead focus first on developing an indicator on broadband services (see B), and second on making available a tool to reproduce and vary the travel time calculations (see 5.5.4.).

More technical information on the existing indicators and how the calculations are made is available in the WIMD 2014 Technical Report. Enhancements will be made where possible.

Food shops – previously included. The shop should be capable of providing basic provisions which are required frequently (e.g. bread, milk). This includes premises from the local corner shop up to large supermarkets.

GP Surgeries – previously included. This indicator covers day-to-day needs for primary health care. Includes main doctor's surgeries or practice addresses and surgery sub-branches.

Leisure centre – previously included. This indicator is intended to cover an individual's ability to access facilities important for health and well-being, in a pay-for-play setting. In WIMD 2014 we included non-commercial sites containing two or more of the following: bowling green, swimming pool, tennis court, squash court, fitness centre and sports hall. Data on locations was sourced from the Sports Council for Wales. In recent years changes to ownership or management of many previously Local Authority run leisure centres have taken place. We will assess the impact of these changes on the concept and practicality of including leisure centres as a service in this domain.

Petrol stations – previously included. Required to run a car on a day-to-day basis. Would only be included in the calculations for average time by private transport.

Pharmacies – previously included. Pharmacies dispense medicinal drugs and increasingly provide health-related advice required by many for day-to-day living. Includes pharmacies within a larger complex or supermarket, as well as dispensing GPs.

Post office – previously included. Many people in a community require weekly or more frequent access to a post office. Post Office services include mail, bill payments, collecting benefits, applications (e.g. for passport, driving licence, residency, National Insurance).

Primary Schools – previously included. Primary schooling is part of day-to-day living for most 4 to 11 year old children, and their parents/guardians (the indicator excludes nursery, special and independent schools). It is not proposed that the indicator covers school buses provided by local authorities due to the difficulties in including them, and the time

restrictions in which they operate (e.g. they would not allow for travel home following after school activities). Travel times included in the calculation are limited to those where a child within the postcode is enrolled at a primary school.

Public library – previously included. Libraries offer services in addition to physical or electronic resource lending, for example, public access to computers and wifi, training and learning activities. Mobile libraries were not included in 2014 due to a lack of geographical data. We will revisit the scope to include mobile libraries if possible.

Secondary Schools - previously included. Secondary schooling is part of day-to-day living for many 11 to 18 year old children (the indicator excludes special and independent schools), and their parents/guardians. It is not proposed that the indicator covers school buses provided by local authorities due to the difficulties in including them, and the time restrictions in which they operate (e.g. they would not allow for travel home following after school activities). Travel times included in the calculation are limited to those where a child within the postcode is enrolled at a secondary school.

Other services discussed

Accident and Emergency Hospitals – These are likely to have more infrequent use and so be less local than some other healthcare services. Consideration was given to including this or a different location (e.g. cultural or shopping centres, transport nodes) to capture travel times to less frequently required yet important services. This change will not be prioritised for WIMD 2019, but re-considered for future indices. The inclusion of A&E hospitals would be complicated by the existence of free hospital transport and ambulances, and consideration would need to be given to which category of A&E department to count.

Cash points – Some ways of accessing cash are covered elsewhere in the domain, for example banking services in certain Post Offices or cash-back from certain shops. Cashpoint fees and minimum spend for cash-back would make it difficult to measure an indicator on ease of accessing cash. Since there also exist popular alternatives to making cash payments, cash points will not be included in the domain.

Child care – Most formal childcare is private provision. This is highly influenced by the ability to pay for childcare (rather than by location), although the current pilot childcare offer in Wales will lead to different situations in different areas. Other issues to consider are the common use of childcare facilities near work rather than home address, and inability to capture “informal” childcare, e.g. friends and family. This will be reviewed for future indices.

Employment centres – Access to suitable employment opportunities was considered. A clear definition of “employment centres” was not readily available, along with datasets to link individuals to their existing employment or suitable opportunities. There would also be some overlap with the employment deprivation domain.

Food banks – food banks provide emergency food supplies for people in crisis. Although important for day-to-day living for those people, overall volumes of use of food banks are likely to be relatively low per area (LSOA). Also, no known dataset with complete coverage of food banks in Wales exists to our knowledge.

B. New proposals for measuring access to broadband services

In the consultation for WIMD 2014, digital services were highlighted by several respondents as an indicator that should be included in this domain. More and more services, including many public services, are delivered online. Access to online services can open up opportunities not previously available. It can increase opportunities for employment, learning and developing skills. Access to online services can help with social inclusion by making it easier to stay in touch with friends or family via social media; and it can help with financial inclusion as some goods and services are cheaper online.
We have looked into measuring access to digital services via fixed line broadband speed, and mobile data service coverage.

Broadband services

A precedent has been set by the Northern Ireland Multiple Deprivation Measure 2017, which included a measure of the proportion of properties with broadband speed below 10Mbs, based on data from Ofcom. This threshold was set as it reflects a minimum requirement for an acceptable service for households. In areas where all connections have broadband speed above 10Mbs, ranking was based on the 30Mbs threshold. This indicator was given equal weight to the other two (measures of travel time by private transport and travel time by public transport) in the absence of a robust rationale for differing rates.

The underlying Ofcom data source is freely available, with the latest update being the Connected Nations update: Spring 2018. As well as thresholds up to 30Mbs, the data covers ultra fast services, with a download speed of at least 300Mbs. There is more information on exactly what this data measures in Annex E.

Welsh Government's Superfast Cymru project aimed to bring superfast broadband access to the majority of premises in Wales not covered by the roll-outs of commercial companies. The project came to an end in early 2018 and provided almost 733,000 premises across Wales with access to fast fibre broadband. Of these 717,000 can achieve speeds of at least 30Mbps with the remainder achieving speeds of at least 24Mbps. The above Ofcom "Connected Nations" report estimates superfast coverage, at speeds over 30mbps, at 92% of Welsh premises as at January 2018.

Welsh Government plans a successor project to further extend the reach of fast reliable broadband across Wales, currently aiming to award a contract in autumn 2018. Ahead of WIMD 2019 we expect another update of the Ofcom "Connected Nations" report and datasets in winter 2018, based on September 2018 data.

We looked at Ofcom data (as at January 2018) on properties unable to receive fixed line broadband at a speed of 30Mbs. Building up from published output area data, we found that over 70 per cent of LSOAs had some properties unable to access broadband at a speed of 30Mbs, thereby having a non-zero indicator value for our proposed indicator, which is:

- Proportion of properties (homes and small businesses) unable to receive broadband at a speed of 30Mbs or higher (includes properties with no broadband coverage).

Similar to the indicators measuring physical access under section A, the proposed measure does not reflect actual use or affordability of access, which would be complex to model.

Commercial and government efforts are likely to result in the ongoing rollout of improved digital services and change in coverage by area. This means that we will need to review the updated figures ahead of WIMD 2019 to ensure a reasonable number of areas are still affected by the issue of lack of access, giving enough variation to reliably rank areas at the more deprived end. If this is not the case, and we are unable to make reasonable adjustments to the measure, we may be unable to include an indicator for WIMD 2019. We would then review the situation for future indices as services and coverage datasets evolve. The aim is that each WIMD is representative of contemporary experiences of deprivation in accessing services.

If we can include the indicator, we will amend the domain description as follows: "The purpose of this domain is to capture deprivation as a result of a household's inability to access a range of services considered necessary for day-to-day living, **both physically and online**."

Mobile data services

In the past there has been support for including an indicator on "not spots" (areas with no mobile signal) in Wales. Advice from Ofcom suggests data on outdoor access is of better quality than indoor access. Analysis of data from Ofcom suggests that only around 10 per cent of LSOAs have **any properties without outdoor 4G access** (the figure is lower for 2G/3G access). This means we would only have information to rank 10 per cent of areas on their mobile data access, probably less given we would use a future update to the data. This does not meet the indicator criteria for WIMD in terms of being a major feature of deprivation. Therefore, due to the extent of full coverage of 4G services across LSOAs according to Ofcom datasets, we are not proposing an indicator on access to mobile data services for WIMD 2019.

5.5.3. Other potential developments

Travel time by public transport - accessibility of indicator data

Some users of this domain's indicator data have stated that visualisations of travel times and ability to vary day and time of journey etc would be useful. We are working with the Office for National Statistics' Data Science Campus to explore the feasibility of developing a tool to allow this, drawing on freely available transport timetables and location datasets. We would like to carry out the calculations for public transport travel times that form part of this domain using this tool. The calculations could then be replicated and varied by others. If this approach is not possible for WIMD 2019, we will aim to improve the documentation around the domain's calculations.

Alternative approach - floating catchment areas

The WISERD team at the University of South Wales have been undertaking research into a refinement of the approach for assessing service accessibility, called the enhanced two-step floating catchment area (E2SFCA) method, a derivative of gravity model techniques. Their work aims to calculate, for each location of interest, a service access figure that takes into consideration the geographical distribution of all supply sites found within a reasonable travel time/distance. Both the proximity and capacity of such sites are evaluated in relation to the potential service demand placed upon each by their own local populations. The resultant floating catchment area (FCA) score is a form of geographically localised supply-to-demand ratio. The score is responsive to service proximity (it increases as time/distance decreases), to cumulative opportunity (it increases if access to more than one service point is possible), to capacity (it increases as service supply volumes increase), and to localised demand (it decreases as competition arising from local populations increase). In order to compute this metric an estimate is required of the likely capacity for every service point, based on some known feature for that service (e.g. number of GPs in a practice, number of pupil places available, number of opening hours per week, etc.). Likewise, it also requires an estimate of potential demand – typically the total population count as reported locally (e.g. by postcode).

The domain group met with members of the WISERD team to discuss the method and its potential application to WIMD, as explored in a recent paper “Measuring Spatial Accessibility to Services within Indices of Multiple Deprivation: Implications of Applying an Enhanced two-Step Floating Catchment Area (E2SFCA) Approach”, co-authored by Nicholas Page, Mitch Langford and Gary Higgs (for the Journal of Applied Spatial Analysis and Policy). There was considerable interest in the idea of modelling supply/demand relationships mediated by distance as a measure of access. However the domain group concluded that at this time replacing the current methodology based on measuring average travel times to nearest located service point with those derived from FCA approaches would be more resource intensive (for example requiring more data to be collected on measures of supply side provision). The domain group and WISERD team agreed that there is insufficient time to work up this method for potential application for WIMD 2019.

However both parties could see the benefit of sharing the data used to construct the accessibility domain of WIMD 2019 so that a parallel set of outputs using the FCA method could be produced around the same time. This would allow potential implications of adopting an FCA approach on Access to Services domain scores to be studied effectively by ensuring that exactly the same data sources were used in both solutions. As the domain construction progresses, the WIMD team will consider the potential to share inputs and methods with the WISERD team. We will also reconsider the application of the FCA approach to the next edition of WIMD.

5.5.4. Weighting

As described in 5.5.1, for WIMD 2014, the travel time indicators were weighted averages of the private and public transport times to each service. Factor analysis was used to combine the resulting indicators for each service.

We are proposing an additional indicator on broadband services, which will need to be weighted together with the travel time indicators. Options to consider are:

- Follow WIMD 2014 process to obtain a combined travel time indicator, and decide how to weight with the broadband indicator e.g. 75% travel time, 25% broadband.

- Factor analysis carried out on the nine travel time indicators and new indicator together.

We have not made a final decision on weighting as this depends on the coverage of the new indicator, in terms of the number of areas affected by lack of access. This will not be known until new Ofcom data becomes available. It is unlikely any indicator on broadband access used in WIMD 2019 would be valid for the next Index, which we will also bear in mind when deciding on weighting. Views are welcome.

5.5.5. Issues for response

- Do you have any comments on the proposed new indicator on access to broadband services?
- Do you have a view on how the indicators on travel times (to key services), and access to broadband services should be weighted together for the overall domain score?
- Do you have any other comments on proposals for the Access to Services domain?

5.6. Housing

5.6.1. Background

Conceptually, the purpose of the housing domain is to identify inadequate housing, in terms of physical and living conditions and availability. Here, living condition means the suitability of the housing for its inhabitant(s), for example in terms of health and safety, and necessary adaptations. In recognition of the fundamental role housing plays in the long-term prosperity and well-being of the Welsh population, housing is one of six cross-cutting priorities in the Welsh Government's national strategy 'Prosperity for All'.

Housing as a component of multiple deprivation is somewhat different to most other domains. Other key domains tend to correlate quite well with each other (e.g. employment with health), whereas housing can show a different picture. Generally, housing tenure, age and type tend to influence measures of housing deprivation, as defined above. For example, different tenures of housing have varying regulations or standards applicable to them, which can influence housing quality. Therefore we would not always expect measures of housing deprivation to correlate strongly with overall deprivation. However, as with poor access to services, the compounding effect of poor housing along with other components of deprivation, such as health can be significant, and is important to capture.

In WIMD 2014 there was a lack of appropriate data available and it was not possible to measure fully housing deprivation according to the description set out above. The housing domain previously included two 2011 Census indicators:

1. The percentage of the population living in overcrowded households
2. The percentage of people living in a household with no central heating.

Full technical information on the WIMD 2014 indicators is available in the Technical Report.

During discussions on developing proposed indicators for the WIMD 2019 housing domain, we took into consideration Shelter's Cymru's Living Home Standard. The standard includes 39 attributes split across 5 dimensions (affordability, decent conditions, space, stability, neighbourhood) and was developed, through public consultation, to define the standard of an acceptable home.

The proposed WIMD 2019 housing domain indicators measure similar attributes to those within the 'Decent Conditions' and 'Space' dimensions of the Living Home Standard. Proposed indicators for other WIMD 2019 domains measure attributes similar to those within the Living Home Standard 'Neighbourhood' dimension. We recognise the importance of the attributes within the Living Home Standard's 'Affordability' and 'Stability' dimensions, but it is not currently possible to measure these types of attributes at small area level in Wales.

5.6.2. Overview of proposals

As stated above, for WIMD 2014 there was a lack of appropriate data available and it was not possible to fully measure housing deprivation according to our WIMD definition. We committed to improving the housing domain ahead of WIMD 2019 and this section describes our intended approach, following a comprehensive review of available data against our indicator criteria.

National and local governments in Wales use two defined measures of adequacy of housing (see 5.6.3), with several sub-elements involved. Although complete local data on these measures is unavailable, it may be possible to use housing surveys and related administrative data to model such measures for use in WIMD 2019. Similar modelling work has been carried out in England and Northern Ireland for several iterations of their respective indices.

This would be the first instance of using modelled data for the WIMD Housing domain. The advantages would be to improve the range of information on housing at the local area for use in WIMD, using indicators which align closely with our definition of housing deprivation set out in 5.6.1. The drawbacks of using modelled data might include lower quality data if the model is not accurate; and possibly an inability to reflect recent interventions/ changes when updating the indicator in future (depending on the reference period and coverage of the data on which the model is based).

On balance, we consider that using a modelled estimate of poor quality housing alongside a reliable Census-based indicator such as overcrowding, would lead to the best possible housing domain for WIMD 2019. We expect to have updated Census information ahead of the next iteration of WIMD, and before that or the following index, expect that the Housing Stock Analytical Resource for Wales (described in 5.6.6) will yield suitable measures based on linked administrative records.

Our preferred option is therefore to cover the following indicators in the 2019 domain:

- Overcrowding (2011 Census-based bedroom measure) to capture availability and to some extent living condition
- The proportion of dwellings with Category 1 hazards under the Housing Health and Safety Rating System (modelled, exact definition and available sub-categories to be developed), to capture physical and living condition
- A further measure of physical and living condition such as overall disrepair (modelled, exact definition to be developed)

Should the development of robust modelled data prove unfeasible, the possible alternative indicators to supplement overcrowding would be:

- A measure of energy efficiency (using data from Energy Performance Certificate records), or
- Lack of central heating (2011 Census-based)

However, we do not currently view either option as a desirable alternative, for reasons described in section 5.6.5.

5.6.3. Proposed new indicator(s)

Frameworks for assessing adequacy of housing in Wales - HHSRS and WHQS

National and local governments in Wales use two defined measures of adequacy of housing. These are described below.

The Housing Health and Safety Rating System (HHSRS: a risk-based evaluation tool) was introduced in England and Wales in 2006. Local authorities use the HHSRS, when requested to assess a property, to determine whether a hazard exists that may cause harm to the health and safety of a potential occupant who is most vulnerable to that hazard. The HHSRS assesses 29 categories of housing hazard in four hazard groups:

- Physiological Requirements
- Psychological Requirements
- Protection against Infection
- Protection against Accidents

Those which score high on the scale (and are therefore the greatest risk) are called Category 1 hazards. If a dwelling contains a Category 1 hazard, the local authority has a duty to take the appropriate enforcement action. Those that fall lower down the scale and pose a lesser risk are called Category 2 hazards – when these occur the local authority may take enforcement action.

The Welsh Housing Quality Standard (WHQS) is the Welsh Government standard for social housing quality. The WHQS was first introduced in 2002 and aims to help ensure that all dwellings are of good quality and suitable for the needs of existing and future residents. The Welsh Government set a target for all social landlords to improve their housing stock to meet the WHQS as soon as possible, but in any event by 2020. The WHQS measures 42 individual elements within the following seven categories:

- In a good state of repair
- Safe and secure
- Adequately heated, fuel efficient and well insulated
- Contain up-to-date kitchens and bathrooms
- Well managed (for rented housing)
- Located in attractive and safe environments
- As far as possible suit the specific requirements of the household (e.g. specific disabilities)

Each of these elements is categorised into a primary or secondary element. Primary elements relate mostly to the safety of the occupants whereas secondary elements relate mostly to the comfort of the occupants.

There is some overlap between the HHSRS and WHQS, and also any element assessed as having an HHSRS Category 1 Hazard would automatically result in the dwelling being non-compliant with the WHQS. Detailed guidance for WHQS sets out under each section the minimum requirements regarding HHSRS hazard types.

New national measurement of HHSRS/WHQS and sub-elements

Established in 2016, the Housing Conditions Evidence Programme (HCEP) is a strategic programme of investment in evidence about the condition and energy efficiency/ performance of housing in Wales. One of its aims is to provide a national view of housing conditions across all tenures, in the context of the WHQS and HHSRS. This will be achieved through the Welsh Housing Conditions Survey 2017-18 (WHCS), a national survey including physical inspections of just over 2,500 properties of all types and tenures of housing in Wales, excluding vacant properties.

Our proposals for a modelled indicator

It may be possible to use housing surveys (including WHCS) and related administrative data to model measures down to small area levels for use in WIMD. We are at the early stages of investigating options for this, but are hopeful that a suitably robust method will provide data in time for WIMD 2019. We propose to continue to prioritise this option.

Using information collected from the WHCS and other property surveys (for example, the English Housing Survey) as a starting point, we have considered the types of measures we would prefer to model down to small area level. This has included measures based on the HHSRS, WHQS and sub-elements of each. We have taken into account the level of detail typically captured in housing surveys, for example, in the WHCS the full HHSRS risk assessment is only carried out on 6 of the main HHSRS hazards, with another 20 either being flagged up as 'Category 1' hazards or being modelled from other survey data. We have also looked at latest available data (from the 2008 property survey) to assess whether measures are likely to represent major features of deprivation.

Local authority action to address poor housing is driven by the HHSRS, which can apply across all tenures, whereas WHQS has predominantly been used as a standard for social housing. We therefore propose to focus on HHSRS, but also to consider key elements of WHQS not covered by the HHSRS framework. Our focus on category 1 hazards under the HHSRS also aligns with the data used to produce the National Indicator that measures the proportion of dwellings free from hazards. Our proposals are to model indicators of:

- The proportion of dwellings with Category 1 hazards under the Housing Health and Safety Rating System (modelled, exact definition and available sub-categories to be developed), to capture physical and living condition
- A further measure of physical and living condition such as disrepair (modelled, exact definition to be developed), which is relevant to the WHQS

5.6.4. Proposed existing indicator

Overcrowding - Percentage of the population living in overcrowded households, from the 2011 Census. Households that are overcrowded are considered deprived in terms of access to suitable housing. This indicator was included in WIMD 2014 and, although the data is rather dated, it is still the most appropriate data for measuring availability at an LSOA level. Also, in the context of potentially adding modelled data on housing quality to the domain, it is important to retain a data source with good coverage of the underlying households. Overcrowding is therefore proposed for inclusion in WIMD 2019.

The definitions of overcrowding are fully explained on the ONS website (2011 Census metadata). As for WIMD 2014, it is proposed that an indicator based on the bedroom measure is used for WIMD 2019.

5.6.5. Other indicators discussed

Dwellings with a SAP rating in band E or lower

We have researched data on Energy Performance Certificates as an option to derive a proxy for housing quality using the recorded Standard Assessment Procedure (SAP) ratings. The conceptual argument is that homes with poor energy efficiency performance are more difficult/ expensive to heat. This data is also used to produce the National Indicator that measures the percentage of dwellings with adequate energy performance. However, it is not clear that SAP ratings are an accurate measure of housing deprivation as defined for WIMD. For example, some people may choose to live in an energy inefficient property due to other desirable features of the property, and still be able to afford to heat it comfortably.

Furthermore, we have concerns about the reliability of EPC data, particularly in certain contexts. An EPC is required for properties when constructed, sold or let. EPC data has been published by the Ministry for Housing, Communities and Local Government. We have obtained and analysed data for Wales, and found it to have a wide range of data quality issues. Although coverage of EPC records across LSOAs was quite good, it is not complete and poses risk of bias. Many records are several years out of date. Further information on our analysis of EPC data and the quality issues found is provided in Annex F.

We propose to rule out the inclusion of an indicator based on EPC data in WIMD 2019, on the grounds of current poor data quality and an uncertain link to deprivation. Other Nations of the UK (including Northern Ireland) have opted not to include an indicator based on EPC for similar reasons. We are aware of significant ongoing work analysing this data in government, academia and commercial organisations, and we will continue to review its suitability as findings are made available.

Lack of Central Heating

This indicator had been included in previous WIMD indices. Although data on the lack of central heating is available from the 2011 Census, this is no longer considered a suitable indicator of housing deprivation. Homes may have a central heating system but this does not mean that the occupants are able to afford to run it. The performance of the system may also be inadequate and inefficient. Only around 2 per cent of households in Wales now lack central heating, which suggests the indicator does not meet our criteria of being a major feature of deprivation.

Fuel Poverty

As defined in the Welsh Government's Fuel Poverty Strategy, a household in Wales is in fuel poverty if they spend 10% or more of their income (including Housing Benefit, Income Support for Mortgage Interest or council tax benefits) on energy costs in order to adequately heat their homes. Fuel poverty has a significant impact on the health, social and economic well-being of householders. However data is not currently available at small

area level for use in WIMD. Also, measurement of fuel poverty is influenced by energy prices and household income as well as features of the home itself. This means that the concept does not meet our indicator criteria of being specific to one domain.

Housing Affordability

This indicator would measure deprivation in terms of lack of access to adequate housing. However, there are conceptual issues with this measure. For example, the areas in which people seek housing vary, and even if we are able to use housing market areas as a proxy for this (which are larger than the LSOA geography) there still maybe significant boundary effects. Conceptually, the indicator also risks overlapping somewhat with the income domain and may not provide a strong reflection of housing availability in an area. An indicator on affordability would look at a ratio of income to average housing costs (possibly to rent and to own) and complex methods would be required to derive a meaningful model. In Wales, average house prices are available but small area income estimates are not and so calculating this is not currently feasible.

Homelessness

Homelessness can be considered to be the most extreme form of deprivation in relation to access to housing, and tackling homelessness is highlighted as a priority in the Welsh Government's national strategy *Prosperity for All*. Data on homelessness prevention is also used to produce the National Indicator that measures the number of households successfully prevented from becoming homeless per 10,000. Whilst this would potentially be a desirable indicator to include, data relating to homelessness is currently only collected and published at Local Authority level. Furthermore, it is very difficult to incorporate in an index of small areas. This is because careful consideration would need to be given to which LSOA we attribute an occurrence of homelessness: it could reflect housing deprivation in the area in which the homeless person previously lived or the area in which he or she is recorded as being homeless. A project is underway to consider the feasibility of collecting case level homelessness data in Wales. Such developments will be considered as part of discussions on future indices.

Off main gas

It was considered whether an indicator that measured the percentage of properties not on mains gas could be a proxy for high cost of heating. However, it was ruled out as an area of priority for WIMD 2019 because nearly half of LSOAs have no affected housing (i.e. we would be unable to rank them) and so this could not be used to measure relative deprivation.

5.6.6. Future development

Housing Stock Analytical Resource for Wales (HSAR)

The Welsh Government is currently developing a Housing Stock Analytical Resource for Wales (HSAR) as part of its Housing Conditions Evidence Programme (HCEP), discussed in 5.6.3. The aim of HSAR is to bring together a range of data on the characteristics, fabric, condition and energy efficiency of the housing stock in Wales. HSAR will combine anonymised data, where possible at an individual property level, and it will be used to inform housing and environment policy direction, particularly relating to housing conditions

and fuel poverty. This resource is still at an early stage of development and so cannot be used to input to WIMD 2019. However, it will be considered in future index iterations, subject to the continuation of the HCEP.

5.6.7. Weighting

If our proposal to include new modelled indicators on housing quality alongside a measure of overcrowding proves feasible, then our approach to weighting the indicators within the domain would be reviewed. Also, the weighting of the domain itself would be increased to a level reflecting the perceived importance and robustness of the revised domain, adjusting other domain weights accordingly.

5.6.8. Issues for response

- Do you have any comments on our proposals to include a modelled indicator of poor housing quality in the housing domain, if possible?
- In developing the modelled indicator, do you have any comments on our proposed focus on hazards (as defined in the Housing Health and Safety Rating System, HHSRS) and on disrepair to capture poor housing quality?
- Do you have any comments on our proposal NOT to include an indicator based on Energy Performance Certificate data in the housing domain, based on low data quality?
- Do you have any comments on our proposal to continue using overcrowding as an indicator of housing deprivation?
- Do you have any comments on our proposal to drop the “lack of central heating” indicator as a measure of housing deprivation?
- Do you have any other comments on proposals for the Housing domain?

5.7. Physical Environment

The purpose of this domain is to measure factors in the local area that may impact on the wellbeing or quality of life of those living in an area.

Environmental deprivation is generally not correlated with social or economic deprivation in Wales (ref: Walker et al 2003). This domain does not capture aspects of deprivation such as health inequalities (this is an objective of the Health domain). Indicators were chosen that were judged to indicate an increased potential for reduced quality of life, and that were readily available.

The domain is broken down into 3 sub-domains.

5.7.1. Overview of Proposals

A summary of our proposals for each sub domain follows, with more detail in section 5.7.2.

- **Proportion of Households at Risk of Flooding**
  - We propose to retain this indicator but derive it from the Flood Risk Assessment Wales (FRAW) data currently being developed by Natural Resources Wales
- **Air Quality Score**
  - We intend to simplify this sub domain by calculating three indicators based on the population weighted averages concentration values of three key pollutants
- **Lack of Proximity to a Natural Green Space**
  - We plan to develop an indicator measuring the proportion of households with a lack of proximity to accessible natural green space. This indicator/sub domain will replace the proximity to waste disposal and industrial sites indicator used in previous iterations of WIMD.

5.7.2. Proposed Indicators

Proportion of Households at Risk of Flooding – A flood risk indicator was included in WIMD 2014 and was sourced from National Flood Risk Assessment (NaFRA) data. For WIMD 2019, we propose the inclusion of a flood risk indicator sourced from the Flood Risk Assessment Wales (FRAW) data currently being developed by Natural Resources Wales.

The flood risk indicator will measure the proportion of households at risk of flooding from rivers, the sea as well as surface water flooding. This represents an improvement to the WIMD 2014 indicator which did not include surface water flooding.

The risk is based on predicted frequency rather than the level of damage caused by flooding. The numbers of households at significant risk of flooding are given higher weighting than those at lower risk.

As for WIMD 2014, it is proposed that different levels of risk will be taken into account and the risk categories will be as follows:

- High ~ greater than or equal to 1 in 30 (3.3%) chance of flooding in any given year
- Medium ~ less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year
- Low ~ less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance in any given year
- Very Low ~ less than 1 in 1000 (0.1%) chance in any given year

To ensure the areas at risk of more severe flooding rank as more deprived than areas at risk of less severe flooding, a weighting will be applied. The following weighting was used in WIMD 2014:

- The number of households in areas at high risk was multiplied by 24;
- The number of households in areas at medium risk was multiplied by 4; and
- The number of households in areas at low or very low risk was multiplied by 1.

We will review and, if necessary, revise this weighting for WIMD 2019.

Each of these numbers will be calculated for each LSOA and then added together to give total normalised number of households at a risk of flooding per LSOA. This number will then be divided by the total number of households in the LSOA to give the proportion of households at risk of flooding.

Estimated Air Quality score - The air quality subdomain is developed using measurements of pollutants that could have negative effects on human health and/or the environment based on the best medical and scientific understanding. It is proposed as a proxy measure of the quality of the surrounding environment. Poor air quality suggests proximity to certain activities such as traffic, domestic combustion and industrial sites – activities that could have a negative impact on quality of life, the local environment and health.

The WIMD 2014 air quality subdomain comprised two equally-weighted indicators:

- Air Concentrations - calculated using a combination of concentration data (modelled on air emission data) for a range of pollutants and Air Quality Management Areas.
- Air Emissions – providing a good set of complimentary data covering pollutants not included in the Air concentration indicator.

For WIMD 2019, it is proposed to simplify the air quality subdomain and derive three indicators based on the population weighted average concentration values of the following pollutants:

- Nitrogen dioxide
- Particulates < 10 µm
- Particulates < 2.5 µm

This will align the air quality subdomain with the relevant National Well Being Indicators as well as provide more transparent and meaningful indicator data for users.

Further consideration is needed to determine how the indicators will be combined to form an overall air quality score for the subdomain.

The data sources for these indicators are DEFRA air concentration grids and the ONS' Small Area Population Estimates (SAPE).

Lack of Proximity to an Accessible Natural Green Space –Natural Green Space is considered to have a positive influence on people's wellbeing. Consideration has been given to an indicator looking at the proportion of households with a lack of proximity (for example, within 300 metres) to an Accessible Natural Green Space (ANGS) excluding private gardens.

'Green space' is used as shorthand for both vegetated land - parks, community gardens, trees, woodlands and hedges, informal spaces, allotments and food growing sites – as well as areas of water, such as rivers, canals, lakes and ponds (often referred to as 'blue space'). The definition also includes the sea shore, maintained for the recreation and enjoyment of communities in our villages, towns and cities.

ANGS data has been developed by Natural Resources Wales and work is ongoing to determine the suitability of this data for the purposes of WIMD 2019.

5.7.3. Other indicators discussed

Proximity to waste disposal and industrial sites Score – The proximity to waste disposal and industrial sites indicator was used in WIMD 2014. The data source for this indicator is Natural Resources Wales.
This indicator was originally developed as a proxy measure to capture the general quality of life arising from living in a particular area. We anticipate that a lack of proximity to natural green space indicator will capture a similar aspect of deprivation. Further to this, the indicator used in 2014 estimated the impact of regulated waste disposal and industrial sites but did not capture proximity to non-regulated sites (which arguably will have more impact on the surrounding environment). Hence, it is proposed that this indicator is not included in WIMD 2019. However, we will undertake further analysis to determine the overall impact of excluding this indicator in favour of including a lack of proximity to green space indicator.

Noise pollution – This indicator would capture sources of noise which would deprive people of a good environment in which to live. This indicator was considered for inclusion in previous indices, but rejected on the ground of a lack of an appropriate data source.
In 2015, the Welsh Government undertook a review of its noise maps to establish which of them required updating. As a result of this work, new noise maps were subsequently produced in 2017 for major roads across Wales and for major industry in the three agglomerations (Cardiff & Penarth, Newport and Swansea & Neath Port Talbot), but not for major railways or for non-major roads and railways in agglomerations.

An indicator sourced from these noise maps was considered for inclusion in WIMD 2019. However, due to the specific coverage of the noise maps, this indicator would result in a substantive number of LSOAs with a zero value and therefore would not meet the WIMD indicator criteria. It is proposed that this indicator is not included in WIMD 2019. The ongoing availability of noise data will continue to be monitored for future indices.

Fly tipping – Fly tipping has a negative impact on the physical environment and deprives people of a good environment in which to live. This indicator was considered for inclusion in previous indices, but rejected on the ground of a lack of an appropriate data source for small areas. This is still the case.

5.7.4. Weighting

As in WIMD 2014, we propose to weight the sub domains equally (1/3 each).

5.7.5. Issues for response

- Do you have any comments on our proposals to simplify the air quality subdomain?
- Do you have any comments on our proposals to include an indicator measuring the lack of proximity to accessible green space instead of the proximity to waste disposal and industrial sites indicator?
- Do you have any views on the proposed weighting within this domain?
- Do you have any other comments on proposals for the Physical Environment domain?

5.8. Community Safety

This domain is intended to consider deprivation relating to living in a safe community. It covers actual experience of crime and fire, as well as perceptions of safety whilst out and about in the local area.

Since the publication of WIMD 2014, there has been a renewed focus on the quality of crime recording by the police. This follows the inspections of forces by Her Majesty's Inspectorate of Constabulary (HMIC), the Public Administration Select Committee (PASC) inquiry into crime statistics and the UK Statistics Authority's decision to remove the National Statistics designation from police recorded crime statistics. This renewed focus is thought to have led to improved compliance with the National Crime Recording Standard (NCRS), leading to the recording of a greater proportion of crimes coming to the attention of the police.

5.8.1. Overview of proposals

We are proposing that no substantive changes are made to the indicators in this domain. More details on the proposed indicators can be found in section 5.8.2.

5.8.2. Proposed indicators

Police recorded burglary (two year average) – this indicator captures actual experience of crime. As in WIMD 2014, the incidents (crimes) are recorded by the four police forces in Wales (North Wales, Dyfed Powys, South Wales and Gwent). The incidents are assigned to the point at which they occurred and allocated to the appropriate lower super output area (LSOA).

Crime codes to be included:

- 28 A, B, C & D Burglary in a Dwelling;
- 28E Burglary – Residential;
- 28G Distraction Burglary – Residential;
- 29, 29A Aggravated Burglary in a Dwelling;
- 30 A &B Burglary in a Building other than a Dwelling;
- 30C Burglary – Business and Community;
- 31 Aggravated Burglary in a Building other than a Dwelling; and
- 31A Aggravated Burglary – Business and Community.

Police recorded criminal damage (two year average) – this indicator captures actual experience of crime. As in WIMD 2014, the incidents (crimes) are recorded by the four police forces in Wales (North Wales, Dyfed Powys, South Wales and Gwent). The incidents are assigned to the point at which they occurred and allocated to the appropriate lower super output area (LSOA).

Crime codes to be included:

- 56 A & B Arson;
- 58A Criminal Damage to a Dwelling;
- 58B Criminal Damage to a Building other than a Dwelling;
- 58C Criminal Damage to a Vehicle;
- 58D Other Criminal Damage;
- 58E Racially or Religiously Aggravated Criminal Damage to a Dwelling;
- 58F Racially or Religiously Aggravated Criminal Damage to a Building other than a Dwelling;
- 58G Racially or Religiously Aggravated Criminal Damage to a Vehicle;
- 58H Racially or Religiously Aggravated Other Criminal Damage;
- 58J Racially or Religiously Aggravated Criminal Damage *(previously codes 58E, 58F, 58G and 58H)*; and
- 59 Threat or Possession with Intent to Commit Criminal Damage.

Police recorded theft (two year average) – this indicator captures actual experience of crime. As in WIMD 2014, the incidents (crimes) are recorded by the four police forces in Wales (North Wales, Dyfed Powys, South Wales and Gwent). The incidents are assigned to the point at which they occurred and allocated to the appropriate lower super output area (LSOA).

Crime codes to be included:

- 37/2 Aggravated Vehicle Taking;
- 39 Theft from the Person;
- 45 Theft from a Vehicle;
- 48 Theft or Unauthorised Taking of a Motor Vehicle; and
- 126 Interference with a motor vehicle.

Police recorded violent crime (two year average) – this indicator captures actual experience of crime. As in WIMD 2014, the incidents (crimes) are recorded by the four police forces in Wales (North Wales, Dyfed Powys, South Wales and Gwent). The incidents are assigned to the point at which they occurred and allocated to the appropriate lower super output area (LSOA).

Crime codes to be included:

- 1 Murder;
- 2 Attempted Murder;
- 3 A & B Conspiracy to Murder or Threats to Kill;
- 4/1 Manslaughter;
- 4/2 Infanticide;
- 5 A B & C, Wounding or Other Act Endangering Life;
- 5 D & E Assault with Intent to Cause Serious Harm or Endangering Life *(previously codes 5A, 5B, 5C, 6 & 7);*
- 6 Endangering a Railway Passenger;
- 7 Endangering Life at Sea;
- 8F, G & K, Other Wounding;
- 8L, 9A Harassment ;
- 8H & J Racially or Religiously Aggravated Other Wounding;
- 8M & 9B Racially or Religiously Aggravated Harassment;
- 8N Assault with Injury *(previously codes 8F, 8G and 8K);*

- 8P Racially or Religiously Aggravated Assault with Injury *(previously codes 8H & 8J)*;
- 10A Possession of firearms with intent;
- 10B Possession of firearms offences;
- 11 Cruelty to and Neglect of Children;
- 12 Abandoning Child Under Two Years;
- 11A Cruelty to Children / Young People *(previously codes 11 & 12)*;
- 37/1 Causing Death by Aggravated Vehicle Taking
- 105A Assault without Injury
- 105B Racially or Religiously Aggravated Assault without Injury
- 34A Robbery of Business Property
- 34B Robbery of Personal Property
- 81 Firearms Act 1968 and other Firearms Act

Anti-social behaviour (two year average) – this indicator links to experience of anti-social behaviour. As in WIMD 2014, incidents are recorded by the four police forces in Wales (North Wales, Dyfed Powys, South Wales and Gwent). The incidents are assigned to the point at which they occurred and allocated to the appropriate lower super output area (LSOA).

Fire incidence (two year average) – this indicator captures actual experiences of fire. In WIMD 2014, incidents of primary fires, secondary fires and chimney fires were collected as counts by LSOA. The domain group proposes to similarly include all incidents of fire for WIMD 2019.

Primary fires include “all fires in buildings, vehicles and outdoor structures or any fire involving casualties, rescues, or fires attended by five or more appliances”. Secondary fires are “the majority of outdoor fires including grassland and refuse fires unless they involve casualties or rescues, property loss or five or more appliances attend”. Chimney fires are relatively small in number (comprising around 4 per cent of all fires in Wales in 2017-18) and are “reportable fires in occupied buildings where the fire was confined within the chimney structure and did not involve casualties or rescues or are attended by 5 or more appliances”.

5.8.3. Other indicators discussed

Domestic Abuse
A domestic abuse indicator was considered for inclusion in WIMD 2019. The police recorded crime data collected by police forces includes a marker for domestic abuse (ie. to indicate where this was a factor in a particular crime). However, the majority of crimes flagged as domestic abuse are violent crimes and therefore would already be included in the Police Recorded Violent Crime indicator. Further to this, there is anecdotal evidence to suggest some disparity in recording practices across police forces. Finally, there is evidence that a significant proportion of domestic abuse incidents are not reported to the police. It is considered that the indicator should not be included in WIMD 2019. However, we will monitor developments in the data and consider the indicator for future releases of WIMD.

Hate Crime
A hate crime indicator was also considered for inclusion in WIMD 2019. As with domestic abuse, the police recorded crime data collected by police forces includes a marker for hate crime (ie. to indicate where this was a factor in a particular crime). However, there would be a notable overlap between crimes flagged as hate crimes and the racially or religiously aggravated crimes already included in the current indicators. There is also anecdotal evidence to suggest some disparity in recording practices across police forces as well as evidence that a significant proportion of hate crimes are not reported to the police. Therefore it is considered that the indicator should not be included in WIMD 2019. However, we will monitor developments in the data and consider the indicator for future releases of WIMD.

Cyber Crime

Cyber crime has been highlighted as an emerging area of crime and therefore considered as a potential indicator. However, the link between incidence of cyber crime and deprivation is unclear at present. Further investigation of this area will be undertaken and we will consider this indicator for future releases of WIMD.

5.8.4. Weighting

Indicators are combined using factor analysis to determine how much weighting each indicator should have within the domain.

5.8.5. Issues for response

- Do you have any comments on proposals for the Community Safety domain?

5.9. Weighting of domains

5.9.1. Background

Each of the domain chapters above has mentioned the weighting used within domains in 2014, and proposals for 2019. This section covers how the domains are weighted together – see Annex A for more details on methodology.

The index is ultimately constructed from a weighted sum of the scores for each domain. The weighted scores are then ranked, for each LSOA. The domain weights reflect the importance of the domain as an aspect of deprivation, and the quality of the indicators available for that domain.

For WIMD 2014, the weights used are listed below.

Domain	Weight
Income	23.5 %
Employment	23.5 %
Health	14.0 %
Education	14.0 %
Access to services	10.0 %
Community Safety	5.0 %
Physical Environment	5.0 %
Housing	5.0 %

5.9.2. Proposed approach to weighting

For WIMD 2019, we are likely to review the weighting given significant developments in several of the domains. The broad approach that we propose to follow is:

a) To retain the highest relative weightings on Income and Employment as key aspects of deprivation. We propose to do this given that, despite the introduction of a new welfare system in Universal credit, the indicators are largely unaffected in terms of quality for this iteration at least.

b) To increase the weight of the Housing domain if we succeed in including modelled data on poor quality housing.

c) Subject to b), to decrease some other (non-Housing) domains' weight to allow for an increase in Housing weight. We would take into account improvements implemented to other domains in doing so.

5.9.3. Question for consideration

- Do you have any comments on the proposed approach to weighting domains in WIMD 2019?

5.10. Next Steps

This consultation exercise begins on 22 October 2018 and **17 December 2018 is the deadline for responses**.

A consultation webinar (online consultation seminar) will be held on 7 November and 3 December, with a Welsh language session on 29 November. This will include a presentation on the proposals together with an opportunity to ask questions.

Further details on the webinars and to register.

Responses to this consultation will be fed back to topic domain groups, the WIMD advisory group, project board and steering group. Membership of these groups can be found in Annex C.

A summary of responses to this consultation will be published in spring 2019. Analysis and production of the updated WIMD will be undertaken throughout summer of 2019, with final publication of the fully updated WIMD planned for late 2019.

In terms of future updates, we welcome views on how often to update WIMD. In the past this has been every three years, but with no particular rationale behind this frequency. Updating WIMD is resource intensive and may not result in significant changes within a short period. We will consider the most appropriate timing to fit in with the likely timing for public services boards' Assessments of Local Wellbeing and other user needs. We will also consider when updated Census data (from Census 2021) will become available to input to the next WIMD.

We would welcome any other comments on the proposals for WIMD 2019 not already covered.

5.10.1. Question for consideration

- Do you have any other comments on proposals for WIMD 2019 (not already covered) or future updates of WIMD?

Annex A: Methodology

For each small area or Lower Super Output Area (LSOA), ranks are calculated for 8 domains (or kinds) of deprivation, with the most deprived LSOA ranked 1 and the least deprived ranked 1909. The 8 domains of deprivation included in WIMD are:

- income
- employment
- health
- education
- community safety
- access to services
- housing
- physical environment

Further information on the techniques used in WIMD can be found in the WIMD 2014 technical report.

Construction of WIMD

Step 1: Data Collection

Administrative and Census data is collected from various official sources and allocated to each of the LSOAs. Administrative data is specifically used due to the robustness that it offers at a small area level. Indicators have been reviewed by domain groups who have specific knowledge about the data sources and potential indicators.

Step 2: Matching data to LSOA level or postcodes

Data are generally not allocated to an LSOA as part of the collection process. Different data sets vary in their level of geographic coding and so different approaches are required. Data sets fall into one of the following categories, shown in order of preference in terms of data quality:

i. data are geocoded and can be allocated to LSOAs exactly using a Geographic Information System (GIS);
ii. data contain the full postal address and can be allocated exactly to LSOAs using ONS lookup tables;
iii. data are coded with some other small area geography (e.g. only postcode) and these can be allocated to LSOAs in some way, using a best fit method if necessary (in a minority of cases)

If the individual records of data are not of a sufficient standard to match to an LSOA, after data cleansing, then an apportionment technique is used (see Annex C in the WIMD 2014 technical report).

Step 3: Construction of indicators

Some indicators require further calculations to become a WIMD indicator. Many of the indicators are expressed as rates (e.g. police recorded criminal damage rate) and are calculated by dividing the number of count of criminal crimes at LSOA level by the appropriate population estimate for that LSOA.

Three of the indicators included in the health domain use age sex standardisation. The aim is to correct the indicators for different age and sex distributions amongst LSOA populations. For example, one might expect to observe a higher rate of deaths in an aging

population than in one consisting predominantly of young families. Standardisation attempts to adjust for these differences in population, so areas can be directly compared. For further information see Annex E in the WIMD 2014 technical report

Step 4: Constructing the domain indices

The preferred method for constructing the domain indices is factor analysis, as this seeks to find a single underlying factor for the domain. Currently, the method of construction varies dependent on the data that is available. The methods are outlined below, in order of preference, with examples from WIMD 2014 provided.

a. Factor analysis

Previously in the Health, Education, Access to Services and Community Safety domains, the statistical technique factor analysis was used to combine the deprivation indicators.

Factor analysis is a method for assessing the extent to which a set of indicators may be measuring the same underlying construct or factor. By analysing the correlation between indicators it is possible to makes inferences about the common factor and, as a result, estimate a 'factor score' (used as the domain index) for each LSOA. Factor analysis cannot be carried out with 2 indicators or less. For further information see Annex A of the WIMD 2014 technical report.

b. Domains with 2 indicators or less

In 2014, the Income and Employment domains both contained one indicator, of de-duplicated counts, which can be summed and expressed as a percentage of the population. Therefore, there is no requirement for factor analysis as these domains already contain a single measure.

For WIMD 2014, the Housing domain contained two indicators, with a decision made to set these at 66.6% (overcrowding) and 33.3% (lack of central heating) weight each.

c. Sub domains

The indicators in the Physical Environment domain were treated as sub domains, which are transformed into scores in the same way as domains are (see step 4), then combined together using equal weights.

The Physical Environment domain was made up of four indicators which form three sub domains. The percentiles for air quality and air emissions are averaged to create the third sub domain. Factor analysis cannot be used as there is no single underlying factor for Physical Environment.

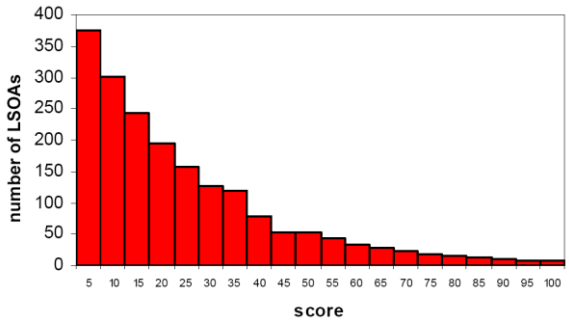
Step 5: Transformation of the indices

In order to reduce the extent to which deprivation in one domain is cancelled out by lack of deprivation in another domain, an exponential transformation is applied to each domain index:

$$T = -23 \ln\left(1 - R\left[1 - e^{-\frac{100}{23}}\right]\right)$$

Where R is the rank of the LSOA divided by 1909. The transformation gives us scores between 0 and 100 for each individual LSOA, for each of the domains. For further information see Annex F of the WIMD 2014 Technical report.

The transformed data has a distribution that looks like:



Step 6: Combination of the Domains

The index is then constructed from a weighted sum of the scores for each domain. The weights reflect the importance of the domain as an aspect of deprivation, and the quality of the indicators available for that domain. For WIMD 2014, the weights used are listed below.

Domain	Weight
Income	23.5 %
Employment	23.5 %
Health	14.0 %
Education	14.0 %
Access to services	10.0 %
Community Safety	5.0 %
Physical Environment	5.0 %
Housing	5.0 %

The weighted scores are then ranked, for each LSOA.

Annex B: Geographical Unit

Geographic unit

It is proposed that the geographic areas used in the calculation of WIMD 2019 are the 1,909 Lower layer Super Output Areas (LSOAs).

LSOAs were used as the geographic unit in WIMD 2005, 2008, 2011, and 2014, and were designed for the reporting of small area statistics. LSOAs are also in line with the approach used by the other three UK nations for their indexes.

Super Output Areas

Following the 2001 Census of Population, the Office for National Statistics developed a geographic hierarchy called Super Output Areas (SOAs). They were designed to improve the reporting of small area statistics in England and Wales. Where available, official statistics are now routinely published for the SOA geography.

There are three layers of SOAs: Lower layer, Middle layer, and Upper layer. This was because disclosure requirements meant that some sets of data could be released for much smaller areas than others. So to support a range of potential data requirements it was decided to create these three SOA layers. These are the constraints.

- A Lower Layer SOA must have a minimum population of 1,000. The mean size of all the Lower Layer SOAs must be close to 1,600. They are built from groups of Census OAs (usually between four and six).
- A Middle Layer SOA must have a minimum population of 5,000. The mean size of all the Middle Layer SOAs must be close to 7,200

Changes between 2001 Census and 2011 Census

SOA boundaries are revised following each Census, to take into account changes in the population. WIMD 2014 was the first Welsh Index of Multiple Deprivation to use the revised boundaries following the 2011 Census. In the 2001 Census there were 1,896 LSOAs, 49 of these were discontinued and 61 new LSOAs were created.

There were changes to LSOA boundaries where populations:

- became too big, the LSOA was split into two or more areas;
- became too small the LSOA/MSOA was merged with an adjacent one; or
- changed significantly, so there was a combination of the two cases above.

In some cases there were also changes following the Output Geography Consultation ran by the Office for National Statistics in 2010. Where LSOAs have changed, the old code has been deleted and a new code has been assigned. To ensure ease of use, English and Welsh names have been allocated to each of the LSOA codes. Each LSOA name has been determined by the Local Authority to which the LSOA belongs.

The following table gives the number of Lower layer SOAs in each Local Authority in Wales.

Local Authority	Number of Lower Layer SOAs
Isle of Anglesey	44
Gwynedd	73
Conwy	71
Denbighshire	58
Flintshire	92
Wrexham	85
Powys	79
Ceredigion	46
Pembrokeshire	71
Carmarthenshire	112
Swansea	148
Neath Port Talbot	91
Bridgend	88
Vale of Glamorgan	79
Rhondda Cynon Taf	154
Merthyr Tydfil	36
Caerphilly	110
Blaenau Gwent	47
Torfaen	60
Monmouthshire	56
Newport	95
Cardiff	214

Electoral divisions

Electoral divisions (previously known as wards) were the basic geographical units used for the Welsh Index of Multiple Deprivation 2000, but there were disadvantages with this approach.

Electoral divisions vary greatly in size, from around 1,000 people to 20,000 (in Wales). This is not ideal for making comparisons throughout Wales, and it also means that data which can safely be released for larger electoral divisions may not be released for smaller electoral divisions due to disclosure rules (that is, the need to protect the confidentiality of individuals).

The boundaries of electoral divisions change. This creates problems when trying to compare data from different time periods. ONS decided to develop a range of areas that would be of consistent size and whose boundaries would not change regularly.

Annex C: Governance Group Membership

This Annex provides a list of all members involved in the development of the proposals for WIMD 2019 (as at consultation publication date). Please note that not all members attended every meeting.

WIMD team

Scott Clifford – WG Social Justice Statistics

Samantha Collins – WG Social Justice Statistics

Nia Jones - WG Social Justice Statistics

George Kamau – WG Social Justice Statistics

Project Board

Stephanie Howarth, WG Head of Economy, Skills and Natural Resources Statistics

Glyn Jones, WG Chief Statistician

Nia Jones, WG Head of Social Justice Statistics (project manager)

Sue Leake, WG Head of Education and Public Services Statistics (Chair)

Steven Marshall, WG Chief Social Research Officer

John Morris, WG Head of Health, Social Services and Population Statistics

Dave Roberts, WG Head of Geography

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Elizabeth Fraser, Scottish Index of Multiple Deprivation, Scottish Government

Caren Fullerton, WG Chief Digital Officer

Alex Hicks, WG Cabinet Office – Delivery Lead

Maureen Howell, WG Deputy Director, Equality and Prosperity

Amelia John, WG Deputy Director, Communities

Glyn Jones, WG Chief Statistician (Chair)

Nia Jones, WG Head of Social Justice Statistics (project manager)

Sue Leake, WG Head of Education and Public Services Statistics

Phil Lewis, WG Head of Prosperity and Valleys Taskforce branch

Helen Minnice-Smith, WG Head of Rural Development

Colin Morris, WG Head of Communities for Work

Jonathan Price, WG Chief Economist

Richard Thurston, WG Deputy Chief Social Research Officer (Education and Skills)

Paul Webb, WG Head of Housing Support & Welfare

Ian Williams, WG Deputy Director, Homes & Places

Members of the WIMD project team

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Janine Edwards, Senior Researcher, Conwy County Council

Andrea Gartner, Population Medicine Research Associate, School of Medicine, Cardiff University

Helen Hodges, Research Officer, Wales Centre for Public Policy

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Nia Jones, WG Head of Social Justice Statistics (project manager)

Peter Lathbury, Head of third sector support, Powys Association of Voluntary Organisations

Sue Leake, WG Head of Education and Public Services Statistics (Chair)

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Sarah Lowe, WG Senior Research Officer, Data Maximisation Team

Cheryl Martin, Development Officer, Children in Wales

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Scott Orford, School of Geography and Planning, Cardiff University

Andrew Stephens, Executive Director, Data Cymru

Andy Wilson, Data, Research & Participation Manager, Torfaen County Council

Members of the WIMD project team

Domain Group Membership

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Sara Ahmad, WG Economist for Equality & Prosperity

David Bailey, Her Majesty's Revenue & Customs

Josephine Daniels, Department for Work and Pensions

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Emma Wright, Office for National Statistics

Health

Annie Campbell, Office for National Statistics

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Ian Thomas, Administrative Data Research Centre Wales

Ceri White, Welsh Cancer Intelligence and Surveillance Unit

Chris White, Office for National Statistics

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Laura Andrews, WG School Statistics

Sioned Cardew-Richardson, Statistics Knowledge and Information Services, ESTYN

Scott Clifford, WG Social Justice Statistics

Samantha Collins, WG Social Justice Statistics

Gwion Dafydd, Ceredigion County Council

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Rachel Lloyd, WG Head of Cross-cutting Education Statistics

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Chris Williams, WG Head of Higher Education Statistics

Access to Services

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Geraint Morgan, Research Officer, Powys County Council

Stuart Neil, WG Head of Agricultural Statistics

Gareth Phillips, WG Historic Environment Knowledge and Information Manager

Alison Thomas, WG Principal Transport Planner

Community Safety

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Scott Clifford, WG Social Justice Statistics

Sarah Cooper, WG Head of Crime & Justice Team

Claire Davey, WG Social Justice Statistics

Brett Davis, South Wales Police

Dan Heap, Data Hub Team, Home Office

Wayne Thomas, Service Performance and Communications, South Wales Fire and Rescue Service

Physical Environment

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Jamie Cleves, WG Housing and Natural Environment Statistics

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James Morris, WG Head of Flood & Coastal Risk Management

Katherine Raymond, WG Head of Strategic Evidence, Environment and Rural Affairs

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Housing

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Jenny Davies, WG Higher Statistical Officer - Housing Conditions Evidence

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Jim McKirdle, Policy Officer (Housing), WLGA

Bob Smith, School of Geography and Planning, Cardiff University

Simon White, WG Head of Housing Strategy & Legislation

Annex D: WIMD 2014 Indicators

Income

- Percentage of the population in receipt of Income Related Benefits or Tax Credits (including dependent children) when they live in a household with an income less than 60 per cent of the Wales median or who are Supported Asylum Seekers

Employment

- Percentage of the working age in receipt of employment-related benefits

Health

- Cancer incidence
- All-cause death rate
- Percentage of live single births < 2.5kg
- Limiting long-term illness

Education

- Key Stage 2 average point scores
- Key Stage 4 Level 2 inclusive
- Key Stage 4 capped point scores
- Percentage of people not entering higher education age 18-19
- Percentage of adults aged 25-64 with no qualifications
- Percentage of pupils missing 15 per cent or more of half day school sessions (Repeat Absentees).

Access to Services

- Average travel time by public and private transport to the nearest: Food Shop, General Practitioner (GP) Surgery, Post Office, Public Library, Leisure Centre, Primary School, Secondary School, Pharmacy and Petrol Station (private transport only).

Community Safety

- Police recorded burglary
- Police recorded criminal damage
- Police recorded theft
- Police recorded violent crime
- Anti social behaviour
- Fire incidence

Physical Environment

- Air emissions
- Air concentrations
- Flood risk
- Proximity to waste disposal and industrial sites

Housing

- Percentage of the population living in households with no central heating
- Percentage of the population living in overcrowded households (bedroom occupancy)

Annex E: Methodology used by Ofcom on Broadband Coverage

Background Information

Ofcom collects and analyses data from the main fixed broadband internet service providers (BT, Virgin Media, Sky, Talk Talk, Vodafone and KCOM) on both their retail services and the services they provide to other ISPs as a wholesale service. The availability data also includes coverage information provided by alternative network providers (B4RN, BU-UK, City Fibre, Gigaclear, Hyperoptic, ITS and Relish). The Ofcom Connected Nations Update: Spring 2018 was based on data provided by the operators.

The information in the Ofcom spring 2018 report may be useful in identifying variations in broadband availability. The report contains broadband coverage from the operators, aggregated at 2011 census output area level. The coverage data was collected as a snapshot in January 2018.

The 2017 Ofcom Report (on which this 2018 spring update is based) notes that “Operators were asked to provide data for each address where a service was provided”. Ofcom identified the number of UK residential and small business premises. This was based on delivery point locations, excluding PO Boxes and large organisations.

Definitions of data items published by Ofcom:

Premises: Count of all premises, in scope, was based on Ordnance Survey AddressBase® Premium (dataset) Epoch 55 – AddressBase is updated every 6 weeks (and this 6 weeks period of time is known as an Epoch). Epoch 55 refers to the update made on 11 January 2018.

Matched Premises: refers to the count of all premises matched to operator records. Unmatched premises are unclassified and excluded from the analysis.

Number of premises unable to receive 30Mbit/s: refers to the count of premises that do not have access to services above 30Mbit/s

Percentage of premises unable to receive 30Mbit/s: refers to premises that do not have access to service at or above 30Mbit/s.

Address matching

The availability of address-level data allows Ofcom to create a comprehensive data set describing the characteristics of all available services and all operators present at premises across the UK. Many operators provided a unique property reference number (UPRN), a common identifier available for use in the UK. Other operators provided address information that would need to be processed and linked to Ofcom’s premise base. Over 52 million records were received from operators and 99.4% of Ofcom’s premise base was matched using a UPRN or building address reference.

Of the remaining 0.6% of premises not matched by UPRN or building address information, a postcode level estimate was applied where, providing that a postcode unit contained at

least one matched premises, any non matched premises were assigned the best available coverage. This method was applied to 125,000 premises (0.4% of the total).

A sample of the remaining premises were investigated and found to represent new builds or commercial properties. It is not possible to determine a specific rule to exclude these premises and therefore they remain in the denominator.

Calculating availability

Each operator provides information on the technology available together with predictions of download and upload speeds.

After the address matching process these characteristics are assigned to each premise to enable further detailed analysis to be undertaken. Ofcom applies thresholds in its analysis to investigate different patterns of provision. For coverage Ofcom have used the maximum predicted download speed available at a premise to determine the broadband category a premise is represented in.

Since the first Connected Nations report in 2011, Ofcom have tracked the progress of superfast broadband roll-out. Ofcom use 30 Mbit/s download speeds as the threshold for defining superfast services, which is also the threshold used by the European Commission.

Annex F: Summary of Energy Performance Certificate Data

Below outlines some of the results and conclusions drawn from exploring the Energy Performance Certificates (EPC) data. It covers analysis we carried out on EPC data made available by the Ministry for Housing, Communities and Local Government. For this analysis, duplicate records were removed so that only the most recent EPC record for each property was included. There is also some analysis carried our on our behalf by the Department for Business, Energy and Industrial Strategy (BEIS).

Summary

As discussed in section 5.6.5, we propose to rule out the inclusion of an indicator based on EPC data in WIMD 2019, on the grounds of current poor data quality and an uncertain link to deprivation.

In terms of data quality, our analysis has found that:

- A large proportion of EPC records are several years out of date and so ratings might not give a current picture.
- There is an EPC recorded for around 40 to 50 per cent of homes in Wales. This means that there are no data for over half of the housing stock in Wales. The available data are also unlikely to be representative of the Welsh housing stock as a whole (e.g. owner occupied dwellings appear to be under represented in the EPC data).
- There are many duplicated EPC records and it is not always clear which record contains the most up to date and correct information. Some of these duplicated records can be identified easily but there are others that are harder to identify (e.g. a record that has a different inspection date but in fact relates to the same inspection).
- There are numerous inconsistencies and unexpected differences between EPC records e.g. where the same property has a different floor type recorded across different inspections.

In terms of apparent trends in energy performance of homes, by looking at the proportion of homes in the worst performing bands (E to G), we found there to be an inverse relationship with general deprivation, as defined by WIMD 2014. This could not be fully explained by differences between deprivation groups in terms of property tenures. At present we do not have the necessary level of data to investigate these patterns further as we would like to, for example by age and type of property.

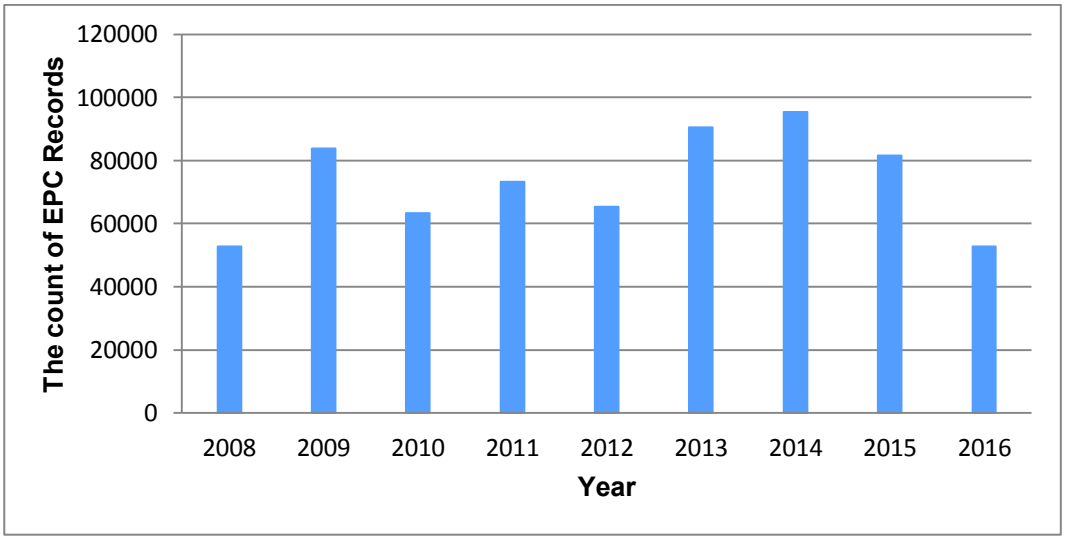
More detailed analysis of the coverage of the EPC records dataset is presented below, followed by our analysis of trends in poor energy performance.

Coverage of EPC records

Coverage of EPC records - by year

Over half of the EPC records analysed were dated from 2012 or before (see figure 1).

Figure 1. The number of EPC records by year



Note that a complete set of 2016 data was not available when undertaking these analyses.

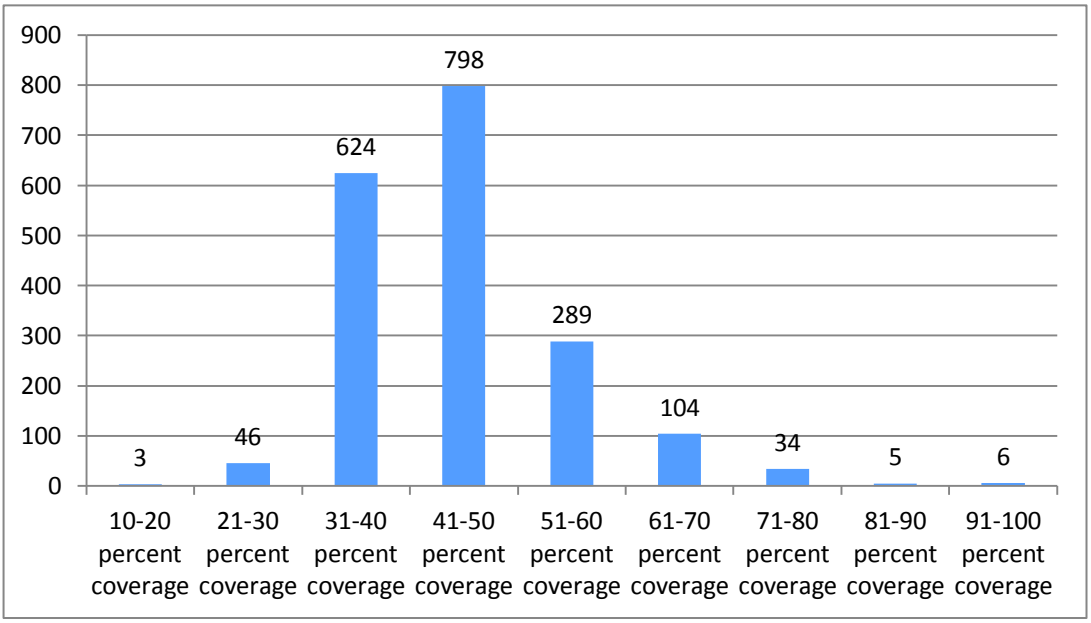
Coverage of EPC records by LSOA

When looking across all 1,909 LSOAs, the count of EPC records in each LSOA ranged from 113 to 1,215. The number of EPC records for each LSOA and the number of dwellings in each LSOA were used to calculate the percentage of dwellings in each LSOA with an EPC record.

Numerator: The most recent EPC record for each property was used and this data ranged from 2008 to 2016 (there were 659,073 records in total)

Denominator: This was the average number of dwellings per LSOA in the years 2014 and 2015. This was derived from the denominator data used in the Community Safety Indicator update in 2017.

Figure 2. The number of LSOAs in each EPC coverage band



When exploring LSOA coverage of EPC data we found that:

- There were 27 LSOAs where 75 per cent or more of their dwellings had an EPC record (since 2008). When only looking at EPC data from 2014 and 2015 this drops considerably.
- Most LSOAs with the highest proportions of EPC coverage were in Cardiff and Newport
- There were 6 LSOAs where 25 per cent or less of their dwellings had an EPC record (since 2008), 3 of which were in Cardiff.

Coverage of EPC records by deprivation and settlement type

Below are some box plot analyses that show the distribution of EPC data across deprivation groups derived from WIMD 2014 ranks and across settlement types.

Figure 3. The spread of LSOA EPC Coverage by deprivation group

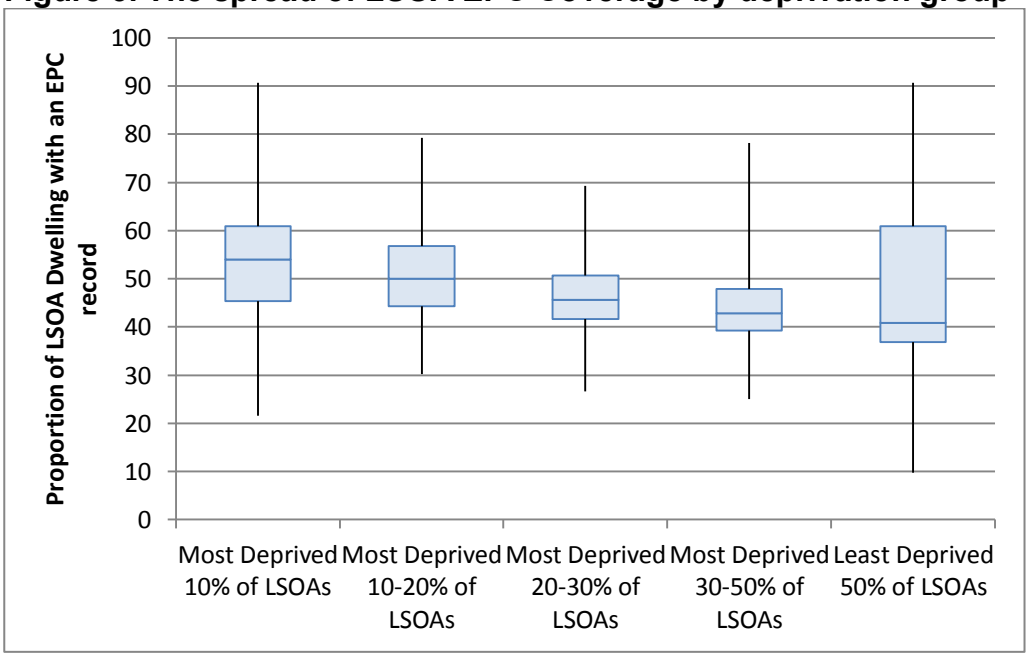


Figure 3 shows that coverage of EPC records is generally higher in the most deprived LSOAs compared to the less deprived LSOAs.

On average, around 55 per cent of dwellings in the most deprived LSOAs in Wales have an EPC record whilst around 40 per cent of dwellings in the least deprived LSOAs have an EPC record.

Figure 4. The spread of LSOA EPC Coverage by settlement type

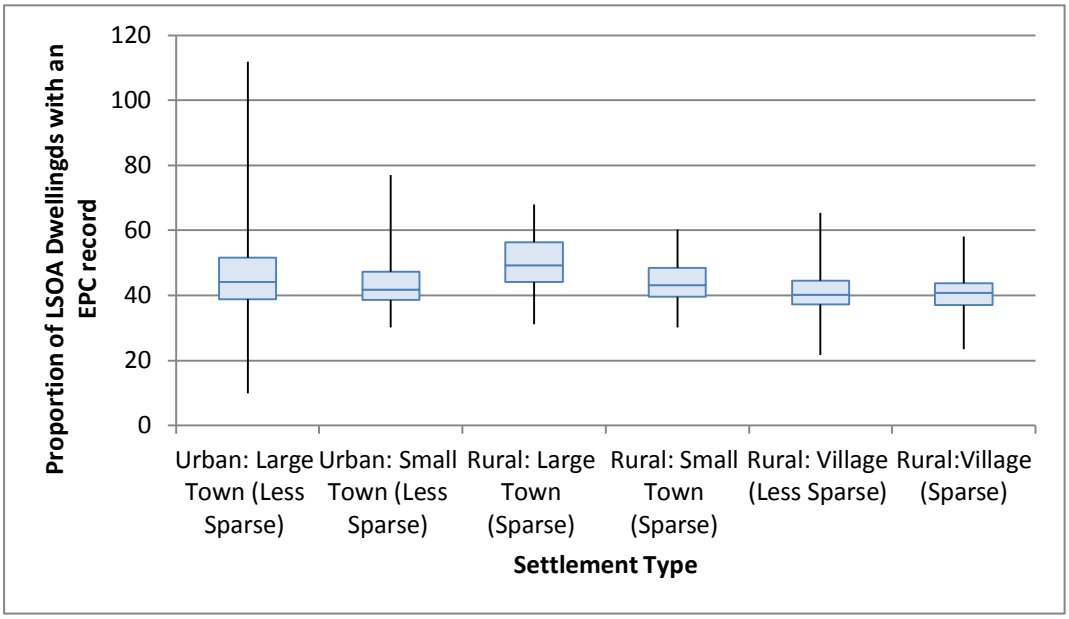


Figure 4 shows that coverage of EPC records doesn't seem to vary much across settlement types. On average, just over 40 per cent of LSOA dwellings have an EPC record in each settlement type.

Trends in poor energy performance

Poor energy performance by deprivation and settlement type

Below are two box plots: Figure 5 shows the distribution of EPC records that have a SAP rating of E to G across deprivation groups derived from WIMD 2014 ranks; Figure 6 shows the distribution of EPC records that have a SAP rating of E to G across settlement types. Dwellings with SAP ratings of E to G are considered to be poor in energy efficiency.

Figure 5. The spread of E-G EPC ratings across LSOAs by Deprivation Group

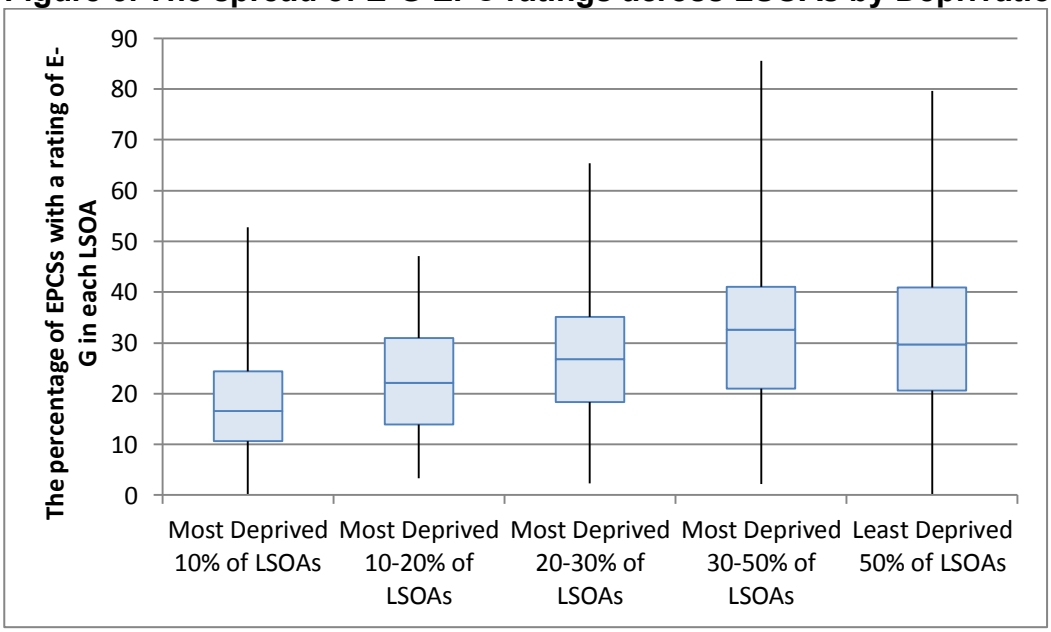


Figure 6. The spread of E-G EPC ratings across LSOAs by Settlement Type

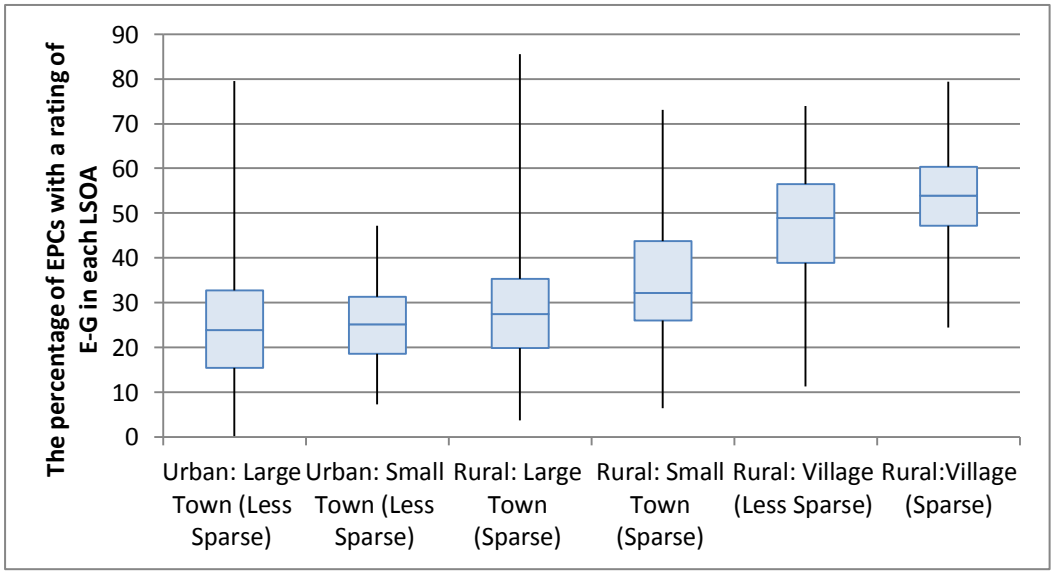


Figure 5 shows that less deprived LSOAs have a higher proportion of dwellings with poor energy efficiency ratings (EPC SAP ratings of E to G) than more deprived LSOAs.

Figure 6 shows that the proportion of dwellings with an EPC SAP rating of E to G is considerably higher in rural LSOAs (particularly those classified as villages) compared with that seen in urban LSOAs.

Poor energy performance and tenure type

The above analysis showed that more deprived areas tend to have better EPC ratings (lower proportions in bands E, F and G). The figures below show how the distribution of EPC records varies with tenure type. The Department for Business, Energy and Industrial Strategy (BEIS) have tenure information at a property level (modelled data from Experian) which they have linked to EPC data. Data aggregated to WIMD 2014 deprivation banding were shared with Welsh Government. The analyses below are based on these figures. However there are a number of data quality issues to bear in mind:

- The BEIS version of the EPC data contains some duplicates.
- BEIS have probabilistically matched addresses from the EPC data to Experian data. This process will not have 100% accuracy.
- Tenure data from Experian are based on responses to Experian lifestyle surveys which are then used to predict the status of all properties using modelling techniques. For more information, see: Domestic National Energy Efficiency Data-Framework (NEED) methodology (pg 35-36).

Table 1. Tenure proportions in EPC data compared to Welsh Government dwelling stock estimates

	EPC data	Dwelling stock estimates
Owner occupied	62%	70%
Privately rented	19%	14%
Social rented	19%	16%

Table 1 shows that most EPC records relate to owner occupied dwellings. However, the proportion of owner occupied homes is lower than in Welsh Government's published dwelling stock estimates. It therefore appears that the owner occupied sector is underrepresented in the EPC data.

Figure 7, 8 and 9 below show the split between EPC bands A – D and E – G for each tenure, across deprivation groups.

They show that the proportion of homes with a poor EPC rating (E - G) increases as deprivation decreases, regardless of tenure. This suggests that the findings shown in figure 5 (that there are a higher proportion of poor EPC ratings in the least deprived areas) can not solely be explained by differences in tenure.

Figure 7. The distribution of EPC ratings for social rented dwellings across WIMD 2014 deprivation groups (Decile 1 is the most deprived)

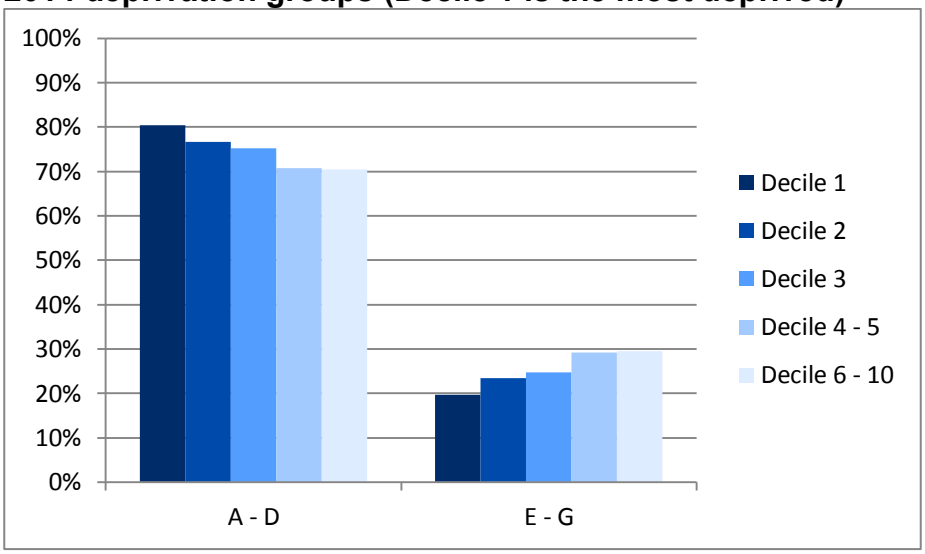


Figure 8. The distribution of EPC ratings for owner occupied dwellings across WIMD 2014 deprivation groups (Decile 1 is the most deprived)

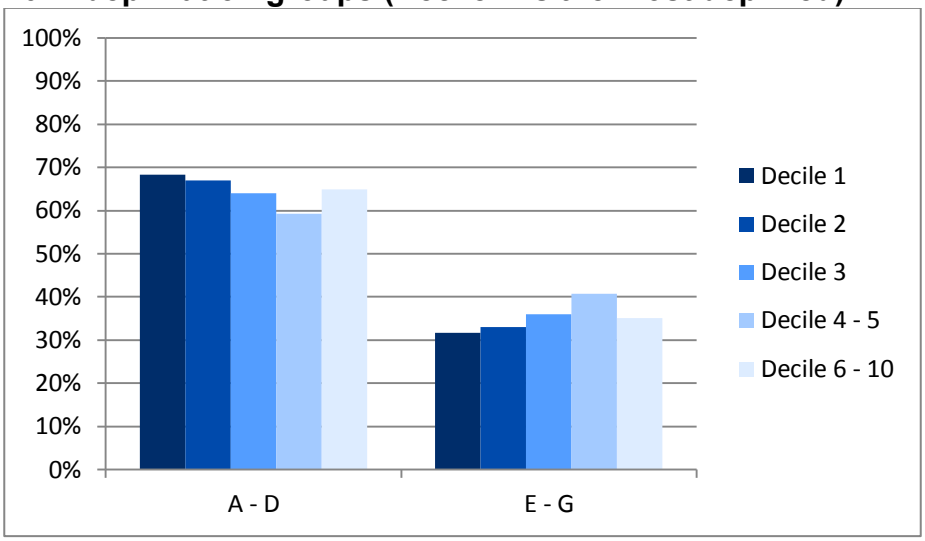


Figure 9. The distribution of EPC ratings for private rented dwellings across WIMD 2014 deprivation groups (Decile 1 is the most deprived)