Technical paper on

Measurement of Multidimensional Quality of Life in Ireland

An analysis of the Central Statistics Office (CSO) Survey on Income and Living Conditions (SILC) Special Quality of Life Module 2013

Dorothy Watson

Bertrand Maître

Christopher T. Whelan

Helen Russell

An Roinn Coimirce Sóisialaí
Department of Social Protection
www.welfare.ie

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Helen Russell

Authors

Dorothy Watson

Dorothy Watson is an Associate Research Professor at the Economic and Social Research Institute (ESRI) and Adjunct at the Department of Sociology, Trinity College Dublin. Dorothy is the ESRI Programme Co-ordinator for Research on Social Inclusion.

More information on the author is available online at:
http://www.esri.ie/person/?userid=130

Bertrand Maître

Bertrand Maître is a Senior Research Officer at the Economic and Social Research Institute (ESRI) and Adjunct at Trinity College Dublin.

More information on the author is available online at:
http://www.esri.ie/person/?userid=105

Christopher T Whelan

Chris Whelan is a Professor Emeritus of Sociology at University College Dublin attached to the Geary Institute for Public Policy.

Helen Russell

Helen Russell is an Associate Research Professor at the Economic and Social Research Institute (ESRI) and Adjunct Professor at Trinity College Dublin.

More information on the author is available online at:
http://www.esri.ie/person/?userid=122

Abstract

In this paper we develop a multidimensional Quality of Life (QoL) index using the Alkire and Foster methodology (2007, 2011a and b, Alkire et al., 2015) and the 2013 EU-SILC data for Ireland. The Index is composed of 11 equally weighted indicators covering 9 dimensions: material disadvantage, financial strain, health problems, mental distress, housing problems, neighbourhood problems, lack of social support, institutional mistrust and lack of safety. The index is calibrated around the income poverty measure. We find that 25.5 per cent of the Irish population experience 3 or more simultaneous problems in quality of life, and – on average – those with multiple quality of life problems are deprived in just over 4 of 11 indicators. In line with income poverty and deprivation measures, we find that the elderly experience lower levels of QoL deprivation, both in terms of incidence and intensity, whereas younger adults experience higher quality of life deprivation. While the level of QoL deprivation varies more by social class than age group, we find that the composition of QoL deprivation varies more by age group than by social class.

Key words: quality of life; adjusted head count ratio (AHCR); multidimensional disadvantage; measurement; social exclusion

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List of Acronyms

AHCR	Adjusted Head Count Ratio
AROPE	At Risk Of Poverty or Exclusion
CIW	Canadian Index of Well-being
CSO	Central Statistics Office
EQLS	European Quality of Life Survey
ESRI	Economic and Social Research Institute
EU	European Union
EU2020	Europe 2020
EuroF	European Foundation
EU-SILC	European Union Statistics on Income and Living Conditions
GDP	Gross Domestic Product
NESC	National Economic and Social Council
OECD	Organisation for Economic Co-operation and Development
QNHS	Quarterly National Household Survey
QoL	Quality of Life
SG	Sponsorship Group on Measuring Progress, Well-being and Sustainable Development
SILC	Survey on Income and Living Conditions
SOM	Self-Organising Maps
VLWI	Very Low Work Intensity

Authors' acknowledgements

1. Introduction

1.1 Purpose of the paper

The purpose of this technical paper is to develop a multidimensional quality of life (QoL) indicator for use in the analysis of group differences in the lived experience of social exclusion in Ireland. An awareness of the limitations of income poverty as a measure of material social exclusion (Ringen, 1987, 1988) has contributed to the development and use of complementary non-monetary measures of deprivation, such as Ireland's indicator of basic deprivation (Maître, Nolan and Whelan, 2006; Whelan, 2007) or the EU indicator of severe material deprivation (European Commission, 2010a). In a similar vein, there is now a recognition that indicators of quality of life need to go 'beyond GDP'. This has resulted in a general commitment in European policy to take into account a broad range of outcomes in assessing the goals and effectiveness of economic and social policy. The focus is not just on economic growth, although growth is important in remedying the negative effects of the recession, but also on dimensions such as health, disability, psychological well-being, satisfaction with other domains of life such as family and social life, and social cohesion (e.g. European Commission, 2013; Stiglitz, Sen and Fitoussi, 2009)[1].

This technical paper draws on the 2013 Survey on Income and Living Conditions (SILC) data for Ireland to develop a multidimensional indicator of quality of life problems. In the spirit of going 'beyond GDP', this analysis goes beyond a focus on the material resources available to households to consider quality of life more broadly. There are over 20 additional items in the 2013 module, dealing with satisfaction with a number of life dimensions (financial situation, accommodation, time use, personal relationships, living environment); trust in institutions; how the person has been feeling lately and physical security (See Appendix Table A3.1). We combine these with core items on health and housing, as well as indicators of poverty and deprivation, in order to examine a broad range of quality of life problems. The decision to focus on the disadvantaged end of the spectrum (quality of life problems rather than quality of life in the positive sense) follows a general concern with social exclusion: it is those who are particularly disadvantaged that are excluded from the normal or typical way of life of a community.

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[1] See also the OECD 'Better Life Initiative' at http://www.oecd.org/statistics/better-life-initiative.htm

1.2 The challenge of capturing multidimensionality

The issue of multidimensionality has been well established in discussions of poverty. Since the work of Townsend (1979) it is accepted that poverty does not simply consist of low income but that it is also about the "inability to participate fully in society" due to a lack of resources (Townsend, 1979, p.31). The acceptance of the multidimensionality of poverty can be seen in the adoption of basic deprivation as well as income poverty in the formulation of Irish poverty targets and in the fact that the Europe 2020 poverty and social exclusion target adopted by the EU in 2010, employs a multidimensional measure which combines three indicators (relative income poverty, severe material deprivation and very low work intensity). In justifying this approach the EU Commission (2011) has emphasised the importance of a multidimensional poverty index in communicating in a political environment and in monitoring developments in 27 different national contexts. However, whether the 'at risk of poverty or exclusion' (AROPE) measure chosen for the European poverty target achieves this objective remains open to debate (Nolan and Whelan, 2011; Maître et al 2014).

The multidimensional nature of poverty creates measurement challenges which have been an important focus of research (Moisio, 2004; Whelan and Maître, 2005; Whelan, Nolan and Maître, 2014; Kakwani and Silber, 2007). The academic and policy debates on such methodological approaches have highlighted a tension between the value of summary indices for communication to a wide audience and the potentially arbitrary nature of the decisions required in combining distinct dimensions. Nolan and Whelan (2007) note that while a case can be made for a multidimensional approach in seeking to adequately measure, understand or respond to poverty, these goals are not the same and the best approach may differ depending on which goal is emphasised.

One challenge that must be faced when multiple dimensions are considered is the question of how to combine them. The simplest or 'counting' approach would be to count the number of dimensions on which an individual is deemed to have a problem (Atkinson, 2003). Atkinson goes on to distinguish between the union and intersection approaches to combining dimensions. The union approach would count as poor or deprived anyone lacking on any of the dimensions. This is the approach adopted in

the EU2020 target: the population 'at risk of poverty or exclusion' consists of those at-risk-of-poverty (i.e. below the 60% of median poverty threshold), *or* experiencing severe material deprivation (i.e. lacking at least four of nine basic goods and services) *or* being in a household with very low work intensity (VLWI) (i.e. a jobless household containing working-age adults). The intersection approach, on the other hand, is adopted in setting the Irish anti-poverty target. This target is defined in terms of 'consistent poverty' which involves being below the 60% of the median income poverty threshold *and* lacking 2 or more of 11 basic goods and services (Department of Social Protection, 2015).

The problem with the union and intersection approaches is that, as a consequence of the fact that deprivation dimensions tend to be more moderately correlated than is generally assumed, they do not perform particularly well in terms of identifying the poor where the number of dimensions is large. The union approach can result in the identification of an implausibly large group while the intersection approach can result in the identification of an extremely small minority that is severely disadvantaged (Whelan, Nolan and Maître, 2014).

A number of increasingly sophisticated approaches to the issue of multidimensionality have been developed, that seek to avoid these problems. The purpose of this paper is to consider the value of applying a specific multidimensional approach with clearly understood axiomatic properties, namely the one recently developed by Alkire and Foster (2007, 2011a and b). This is a methodology that allows one to examine differences between groups in the level and pattern of multidimensional disadvantage. In other words, it goes beyond statements about whether one group has a greater overall level of disadvantage than another, to identify the particular aspects of life – access to material resources, social relationships, health and so on – on which different groups may be challenged.

This methodology originated in the economic literature on the multidimensionality of poverty and inequality that was largely influenced by the work of Amartya Sen (1979; 1985; 1992, 1999).The approach initially focused on multidimensional poverty in the developing world (CONEVAL, 2010; Alkire and Santos, 2010, 2014; Angulo et al., 2013; Ministerio de Desarrollo Social, 2015). Recent work by Alkire et al (2012),

Watson, Maître and Kingston (2014), Whelan et al (2014), Williams et al. (2014) has applied this approach to European developed countries.

The methodology is described in more detail in the next section. Here we note that it has the advantage of being explicit about the choices that need to be made: which dimensions to include, how to weight them and what threshold to adopt in identifying the 'poor' (or, in the present case, those with quality of life problems).The approach allows us to identify a group that is multiply deprived and to compare groups in terms of the contribution of the different dimensions to their deprivation. In the case of quality of life, for instance, the approach allows us to compare groups in terms of the relative contribution of different dimensions such as material deprivation, health problems and housing problems to their overall set of QoL problems (Watson, Maître and Kingston, 2014).

1.3 Dimensions of quality of life

There is no universally agreed set of dimensions of quality of life. Several studies using different waves of the European Quality of Life Survey (EQLS)[2] have identified a wide range of dimensions related to the quality of life. In the analysis of the first EQLS, Fahey et al (2005) identified 19 quality of life indicators, including material deprivation, housing defects, neighbourhood environment, self-rated health and quality of public services. Using the second EQLS, Layte et al. (2010) used measures of perceived social exclusion as well as mental well-being.

The analysis of quality of life is commonly informed by the capabilities approach of Sen, which emphasises the type and range of things that people are enabled to do or to be, rather than focusing on the material resources available to them (Sen, 1992, 1993). This includes personal resources such as health and mental well-being; resources based on economic transactions (material well-being, accommodation problems); resources linked to the quality of social relationships (social capital, network support) and resources deriving from the social, economic and political setting (neighbourhood, public services, social tensions, perceptions of belonging or exclusion).

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[2] See http://www.eurofound.europa.eu/european-quality-of-life-surveys-eqls

The diversity of dimensions identified in a selection of different approaches can be seen in Table 1.1. In Irish research, the NESC (2009) report adopts a capabilities approach to QoL (Sen, 1999) and identifies six dimensions of well-being: economic resources, work / participation, relationships and care, community and environment, health and democracy, and values. The report understands well-being as:

> "a positive physical, social and mental state. It requires that basic needs are met, that individuals have a sense of purpose, that they feel able to achieve important goals, to participate in society and to live lives they value and have reason to value. Well-being is enhanced by conditions that include financial and personal security, meaningful and rewarding work, supportive personal relationships, strong and inclusive communities, good health, a healthy and attractive environment, and values of democracy and social justice" (p. 3).

The report recommends a well-being test which would take account of:

- Capability: what individuals are enabled to do or to be (not just the material resources available to them);
- Agency: capacity of individuals to make decisions about their lives;
- Purpose: having a sense of purpose and ability to engage in meaningful activity;
- Social interaction: supportive relationships with family, community and wider society;
- Common good: a society that emphasises justice and equality; and
- Sustainability: in use of resources.

It is worth noting that several of these aspects of QoL refer to individual qualities (agency, capability, purpose), some which are intra-individual (social interaction and supportive relationships) and some which are societal (common good, sustainability). The latter two, in particular, cannot be identified through data on individuals but require an assessment of the social and political structures of a society.

The *Canadian Index of Well-being* (CIW, 2012)[3] provides a measure of quality of life at the societal level that covers 8 dimensions: community vitality, democratic engagement, education, environment, health, leisure and culture, living standards, and time use. Again, these indicators are not necessarily measured at the individual level.

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[3] See https://uwaterloo.ca/canadian-index-wellbeing/

Table 1.1: Dimensions of quality of life in different studies

	NESC	CIW	OECD	EuroF	SG	ESRI
Material living standard	✓	✓	✓	✓	✓	✓
Mental / emotional well-being				✓		✓
Health	✓	✓	✓	✓	✓	✓
Work and other participation	✓		✓		✓	
Time use / work-life balance		✓	✓			
Supportive relationships	✓			✓		✓
Social tensions, lack of safety				✓	✓	✓
Community vitality / involvement		✓		✓		
Democracy and values	✓	✓			✓	
Institutional trust						✓
Leisure / culture		✓			✓	
Financial strain						✓
Education		✓	✓		✓	
Housing			✓	✓		✓
Perceived social exclusion				✓		
Community / neighbourhood / environment	✓	✓	✓	✓	✓	✓
Life satisfaction / general satisfaction			✓		✓	
Public service quality				✓		

OECD: OECD Better Life Index; NESC: = NESC, 2009. CIW = Canadian Index of Wellbeing. EuroF = Watson, Maître and Kingston, 2014. SG = Sponsorship Group on Measuring Progress, Well-being and Sustainable Development (2011); ESRI= the present analysis.

The *OECD Better Life Index* identifies several dimensions on the basis of which countries are given a score: housing, income, jobs, community, education, environment, civic engagement, health, life satisfaction, safety and work-life balance. It is worth noting that not all of these dimensions will be relevant to all stages of the life-cycle: work is directly relevant to the working-age population and work-life balance is particularly relevant to working families. The indicator of general life satisfaction is different from the others in its generality. Some have argued that life satisfaction is best regarded as an overall summary of quality of life that captures people's experience in a way that allows them to assess their lives on the basis of what is important to them (Watson, Pichler and Wallace, 2010).

The Sponsorship Group on Measuring Progress, Well-being and Sustainable Development (2011)[4] follows the Stiglitz-Sen-Fitoussi Commission in recommending a multidimensional approach to measuring quality of life. The group endorses the following dimensions:

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[4] See http://ec.europa.eu/eurostat/web/ess/about-us/measuring-progress

- Material living conditions (income, wealth and consumption);

- Health;

- Education;

- Productive and valued activities (including work);

- Governance and basic rights;

- Leisure and social interactions (inclusion/exclusion);

- Natural and living environment;

- Economic and physical safety; and

- Overall experience of life.

Although this list does not include housing as a separate dimension, housing conditions are included under the 'material living conditions' dimension and the burden of housing costs is included along with financial insecurity and personal insecurity under the 'economic and physical safety' heading.

There is clearly no one set of right dimensions on which one should focus in seeking to capture quality of life. The choice of dimensions will be influenced by a range of factors. First, the dimensions must correspond to the unit of analysis. For example, the level of inequality in a society or the level of democratic involvement might be considered an important component of quality of life for all members of a society. However, if this is measured at an aggregate level, such as the Gini coefficient or the system of governance, then it is suitable for comparing nations but not for comparing individuals within a nation.

Second, the use of the range of comparisons to be made is important. If one wishes to compare levels of QoL problems for people at different stages of the life-cycle, for instance, dimensions should be chosen which are relevant to the stages being compared. If one were to include a dimension which is relevant only to families with children (e.g. lack of access to affordable childcare), then we have introduced a dimension on which those over 70 are unlikely to have a deficit. This limits the usefulness of the indicator in making comparisons across age groups.

The presumed causal sequence is another factor to be considered, particularly where it is planned to include an indicator of QoL in a statistical model. For instance,

for some purposes level of education might be seen as an outcome in its own right, particularly when comparing groups reasonably close to one another in age. For other purposes, one may be interested in the extent to which different levels of educational achievement are causally related to QoL outcomes more generally – such as access to material resources. In relation to causal sequence, for instance, variables such as education and labour market experience are of particular relevance in that they may be emphasised as important determinants of QoL or as elements of QoL in their own right at particular life-cycle stages. It would not be possible to assess the impact of educational achievement on quality of life, for instance, if one included educational achievement as a component of the QoL indicator. As Whelan and Whelan (1995: 29) argue, an uncritical insistence on multidimensionality in the indicator could paradoxically have the effect of obscuring the processes involved in generating social exclusion.

Finally, the range of potential QoL indicators available in the data is a constraint. It is rare to have a data source that would cover all possible dimensions in depth. Here we are fortunate that the SILC data in 2013 included a range of QoL indicators in addition to the core measures of poverty, deprivation and economic stress.

In this report we drew on the body of work on QoL to identify the relevant dimensions and their corresponding measures as described in the next section below. In order to apply the Adjusted Head Count Ratio (AHCR) methodology of by Alkire and Foster (2007, 2011a and b) to maximum effect, we keep to a limited number of dimensions. In order to be able to compare across life-cycle stages and social classes in a subsequent piece of work,[5] we choose those dimensions which are relevant to the total adult population. The latter criterion means that we have not included indicators that are relevant to a subset of the population (such as work-life balance, job satisfaction or childcare).

Each domain is measured so that a high score indicates a challenge or deficit in this area. Although it would be possible to reverse score the items and focus on the best rather than the worst outcomes, it is normally the latter that are the more compelling policy focus. In fact, the logic of social inclusion is based on the idea of enabling all members of society to participate in the typical level of living which leads to an

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[5] As part of the Department's research programme with the ESRI a study is underway investigating changes in the social risks of life-cycle groups. It uses the QoL measure developed in this paper.

emphasis on the gap between the most disadvantaged and the middle of any distribution rather than on the gap between the middle and the most advantaged.

The dimensions included here are:

- Material disadvantage (deprivation and income poverty);
- Financial strain;
- Health problems;
- Mental distress;
- Housing problems (overcrowding, quality problems);
- Neighbourhood problems (local nuisance);
- Lack of social support;
- Institutional mistrust; and
- Lack of safety.

As we will see in the next section, some of the dimensions are measured by a single indicator (such as health); others are measured on a scale (such as mental distress) and some dimensions are measured by several indicators that we keep separate in the analysis because they are problems for different sectors of the population. In the case of housing problems, for instance, crowding tends to be more of an issue for larger households, especially those with children, while housing quality problems are not necessarily an issue for the same groups. In general, if there is little to be learned from keeping items that tap the same underlying dimensions separate and where they correlate strongly, we combine them into a scale. If the items tend to characterise somewhat different problems that affect different groups, we keep them separate.

1.4 Outline of paper

In the next section we describe the data and the methodology adopted here, including a detailed account of the dimensions chosen and the choice of threshold adopted. In Section 3 we analyse the multidimensional indicator of QoL deficits by age group and social class to demonstrate its usefulness in highlighting the different quality of life challenges faced by groups in the population. In Section 4 we conclude by noting some of the limitations of the analysis and pointing to areas where further development of the concept of multidimensionality in the context of understanding quality of life is needed.

2. Data and measurement

2.1 Introduction

In this section, we provide an overview of the SILC survey design and data for 2013 and describe the logic of the AHCR methodology. It is worth reiterating here that we are developing a measure that will be applicable at the micro-level. In other words, each individual will have a score that will characterise the level and intensity of their quality of life problems and to which the different dimensions of QoL make varying contributions depending on the individual's circumstances.

2.2 SILC data

2.2.1 Survey design

The Survey on Income and Living Conditions (SILC) is designed to provide statistics on household and individual income as well as related indicators of living standards, poverty and inequality (CSO, 2012a, p. 87). The sample is a four-year rotating panel design, with one quarter of the sample replaced by a new random sample in each year. Within each household, every adult (aged 16 and over) is interviewed face-to-face and detailed information is also collected on the household as a whole. The sample size in 2013 was 4,922 households and 12,663 individuals.

SILC involved a two-stage sample design with both stratification and clustering. The strata are eight area types based on the Census of Population. At the first stage, 1,690 'blocks' are selected to proportionately represent the eight strata. The second stage of sampling involves the random selection of a sample of households (including two substitute households) from each block. In cases where interviewers could not secure an interview from a sampled household, they approach the two substitute households in a pre-determined order (Haase and Pratschke, 2012, p.2).[6]

The SILC sample is re-weighted to ensure that it is representative of the population. After re-weighting based on the inverse of the probability of household selection (design weights), the SILC sample is calibrated to population totals for age by sex (four age categories), region (eight regions) and household composition (six categories) (CSO 2012b, p. 88).

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[6] From 2014, the sampling for the survey was modified to include stratification by area characteristics such as affluence / deprivation and the substitution for non-response has been more strictly controlled. The period covered by this report is 2013, however, when the older sampling system was still in place.

2.2.2 The quality of life Indicators

In 2013, a special module was added to the SILC survey designed to capture a range of dimensions of quality of life in addition to the core variables collected in every wave. The QoL module was completed by adults in the household who were interviewed directly (i.e. excluding those interviewed by proxy). Since many of the items referred to subjective states, such as satisfaction and emotional well-being, proxy data would not have been useful. Therefore, we excluded the population interviewed by proxy. The rate of proxy interviews in SILC 2013 was high (at about 35 per cent), so that the module data was available for just over 6,100 adults, or 65 per cent of those over the age of 16. Appendix Table A3.1 shows the list of items in the 2013 module as well as some key additional core items that we included in this analysis.

2.3 Adjusted head count ratio (AHCR) methodology

As noted in Section 1, the AHCR methodology was developed in order to address some of the challenges of combining different indicators into a multidimensional indicator of poverty. It shares with techniques such as Latent Class Analysis (Lazarfeld, 1968; Goodman, 1974; McCutcheon, 1987) or Self-Organising Maps (or SOM, see Whelan, Lucchini, Pisati and Maître, 2010, for an application to deprivation) an attempt to go beyond the disadvantages of the simple union or intersection approaches to combining multiple indicators to identify a deprived group. It differs from latent class analysis and SOM in that as well as allowing the identification of a disadvantaged group, it provides a measure of the intensity of their disadvantage and allows an assessment for different groups of the relative contribution to their multidimensional deprivation of the different dimensions.

Here, following Watson, Maître and Kingston (2014) we apply the technique to the analysis of the quality of life. The goal of the method is to arrive at an indicator which allows us to describe both the *level* of QoL deficits across dimensions and to characterise the profile of QoL deficits for different groups. So, for instance, we would like an indicator that allows us to say (a) whether one group experiences 'more severe' multidimensional QoL problems than another in terms of the depth of deprivation and (b) whether the groups differ in terms of the relative contribution of the different dimensions of QoL to their overall QoL - in other words, in terms of their QoL profiles.

There are a number of decisions to be made in applying the AHCR methodology:

1. The choice of dimensions and indicators to measure them and the weight to be applied to each dimension;

2. The decision regarding the threshold on each indicator beyond which an individual will be regarded as 'deprived' or as 'experiencing a deficit' on that indicator;

3. The choice of threshold on the overall multidimensional indicator: on how many dimensions must someone experience problems before they are regarded as having multidimensional QoL problems (rather than having a problem on just one dimension).

2.3.1 The choice and measurement of dimensions

In choosing the dimensions in the present analysis we had the set of QoL items included in the 2013 SILC module, as well as a number of items from the core of SILC. Given the focus of the research programme on social inclusion, it was important to include the two national indicators of poverty: income poverty and basic deprivation, which are among the core variables on SILC. The other dimensions we included are summarised in Table 2.1 and described in more detail in Appendix Table A3.2.

In some cases, we had several items capturing a related aspect of QoL, such as the 5-item mental distress indicator or the 5 item measuring financial strain. In other cases, we had just a single item measuring a concept, such as health or a feeling of safety. In some cases, such as housing, there were a number or items that, on the face of it, captured aspects of housing problems but not all of them were strongly associated. In deciding which items to combine together into a single indicator, we were guided by the results of a factor analysis, which identifies the extent to which indicators were capturing the same underlying dimension. For instance, in the housing domain we kept housing quality and crowding separate because they did not emerge as highly associated. This happens when different groups in the population experience different types of housing problems. As we shall see later, crowding is a feature of families with children while housing quality problems tend to be more significant for younger and older adults.

Table 2.1: Dimensions of quality of life and indicators of each dimension

Dimension	Indicators
Material disadvantage	Income poverty – in household with equivalised income below 60% median Deprivation –11 basic goods and services identified in the national basic deprivation measure, covering an inability to afford adequate food, clothing, heating, replacing worn furniture and basic social engagement.
Financial strain	A single composite indicator based on five items: Difficulty making ends meet Housing costs burdensome Going into debt to meet ordinary living expenses Arrears on mortgage/rent or utility bills Inability to save
Health problems	Self-rated health is 'fair', 'bad' or 'very bad'
Mental distress	WHO 5-item indicator of mental distress, frequently feeling nervous, depressed, down; infrequently feeling happy, calm
Housing problems	Crowding – number of persons per room and number of persons per bedroom. Quality problems (dampness, insufficient light)
Neighbourhood problems	Local Nuisance – an indicator based on three items – problems with noise, pollution and crime in the area.
Institutional mistrust	A single indicator based on three items: Low level of trust in political system, legal system, police
Lack of social support	A single indicator based on two items: someone to talk to and able to get help from others
Lack of safety	A single indicator based on one item, feeling unsafe walking in area after dark.

There were certain indicators we did not include. Household joblessness was not included because it is not defined for households which contain no working-age adults, such as pensioner households. Since one of the goals of the analysis was to develop an indicator which could be used to analyse the quality of life challenges presented at different life-cycle stages, the inclusion of an indicator which was undefined for one life-cycle stage would have been a major problem. A similar logic led us to drop indicators of work-life balance, job satisfaction and commuting time. Education is often included as a separate dimension of quality of life, as discussed in the previous section. This has particularly been the case in relation to comparative analysis at the macro level. Here, however we wish to keep individual socio-economic characteristics which may influence quality of life separate from the outcome indicators. Since social class is a key independent variable in our analysis and educational level is a key indicator of social class, it would be inappropriate to include education as a dimension of an indicator of QoL to be predicted by social class.[7]

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[7] There is also the general problem of finding an indicator of education that functions well across different life-cycle stages. There are very large differences in achieved level of education for different age cohorts.

Each of the eleven indicators is weighted equally, following Whelan, Nolan and Maître (2014). The consequence of this is that the two domains where we kept the indicators separate (material disadvantage and housing) are weighted more highly than domains with just a single indicator, such as health or mental well-being. In the case of material disadvantage, the strong emphasis fits with the purpose of the present project as part of a research programme on social inclusion and equality. In the case of housing, as we shall see below, the issues of crowding and housing quality problems tend to arise for different groups so the inclusion of two indicators does not have a major impact on the relative positions of different age groups or social classes.

2.3.2 The choice of threshold on the individual items

Having chosen the indicators, we now need to decide at what level the person will be regarded as having a QoL problem on each indicator. Given a set of QoL dimensions considered as of equal weight, if a person's outcome on a given dimension j exceeds the appropriate threshold z_j then the individual is said to be deprived on that dimension.

If we have an item with a yes/no response, then the choice is limited to taking the group with the 'yes' responses as having a quality of life deficit. Where there is a range of responses or a scale, there is an element of arbitrariness in deciding on a threshold on the basis of which to identify those with QoL problems. One wants to identify a group for whom the problem is in some sense significant. The rationale we adopt here, following Whelan, Nolan and Maître (2014), is to take the income poverty rate (at-risk-of-poverty rate) as a benchmark. Income poverty is a widely-used indicator of poverty in the EU as well as in Ireland. In 2013 the at-risk-of-poverty rate across the entire population in Ireland was 15.2 per cent. We choose the threshold on each QoL indicator that identifies a group that is as close as possible in size to the overall percentage of people who are at-risk-of-poverty. This threshold has the merit of being linked to an indicator of social exclusion that has broad acceptance in

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Education functions partly as a 'positional good' (Jonathan, 1990; Ranson, 1993) - the link between education and advancement is a function of an individual's level of education relative to that of others seeking work or promotion at the same time. Including level of education in a multidimensional indicator would create difficulties, then, in comparing across age cohorts because it would mask the fact that having a degree or diploma would have conferred a much greater advantage on someone who is now in their sixties than on someone who is now in their twenties.

European social policy. Although, as noted above, there are problems in relying on income poverty to capture lack of access to material resources, this is a problem of the comparability of the indicator across groups. Here we are just using the overall income poverty rate to anchor the identification of deprivation on each indicator.

Table 2.2 describes the threshold adopted for each indicator and the percentage identified as experiencing disadvantage on each. Since the QoL analysis is limited to the adults aged 16 and over who were interviewed directly, their income poverty rate is a little lower (14.6 per cent) than for the general population, because the rate of income poverty is higher for children who are not included here.

Table 2.2: Threshold adopted on indicators of each dimension

Domain	Indicator and Threshold	% identified
Material disadvantage	At-risk-of-poverty (Below the 60% of median income threshold)	14.6%
	Deprivation (lack 4 of more of the 11 basic deprivation items).	13.0%
Financial strain	Financial strain (5-item scale; threshold taken as having problems on 4 or 5 of the items).	16.0%
Health problems	Health problems (self-rated health 'very bad', 'bad' or 'fair')	19.8%
Mental distress	Mental distress (average on 5-item scale; threshold taken as those scoring 2 or higher on the scale ranging from 0 to 5).	16.1%
Housing problems	Crowding (additive scale for number of persons per room/bedroom, ranging from 0.06 to 2.06; threshold taken as score of 1.24 or higher.)	17.3%
	Dwelling quality problems (the 2-item scale; threshold taken as having problems either with dampness or with insufficient light.).	18.2%
Neighbourhood problems	Local nuisance (3-item scale; threshold taken as having problems with noise, crime or pollution in the local area.)	20.2%
Institutional mistrust	Institutional mistrust (3-item scale; threshold taken as those scoring 2.1 or higher on a scale ranging from 0 to 3).	16.1%
Lack of social support	Lack social support (2 item scale; threshold taken as either having nobody with whom to discuss personal matters or nobody to ask for help).	6.7%
Lack of safety	Lack safety (feel 'very unsafe' in local area after dark)	12.2%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N=5760).

The threshold for the deprivation items was 4 or more items which is higher than the basic deprivation threshold of 2 or more. This is because the level of basic deprivation (close to 30 per cent across the entire population in 2013) was much higher than the 15.2 per cent which is the target cut-off here. In fact, the level identified by the 4+ threshold is 13 per cent, which is much closer to the target.

Apart from lacking social support, the range across the dimensions is from about 13 per cent to about 20 per cent. The threshold on the indicator for lacking social support is lower at just 6.7 per cent, because very few people identify a lack of social support on these indicators.

2.3.3 The choice of threshold on the multidimensional indicator

The breadth of each person's QoL deficit is simply the number of QoL problems experienced, that is, the number of items on which their score exceeds the threshold. Figure 2.1 shows the percentage of the adults who exceeded the threshold on each number of dimensions. Well over one quarter of adults (29 per cent) experience QoL deficits on none of the 11 distinct indicators while over one quarter experience QoL deficit on just one (27 per cent). As the number of dimensions increases, the percentage of adults experiencing that level of QoL problems declines, reaching less than one per cent by the time we get to eight indicators. None of the sample experienced deprivation on more than 9 of the 11 distinct indicators.

Figure 2.1: Percentage of adults experiencing QoL deficits by number of dimensions
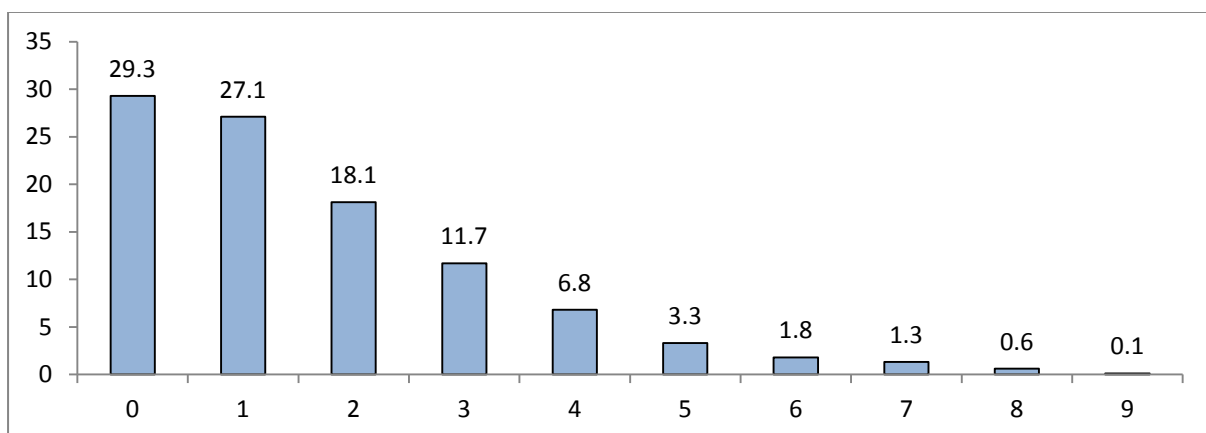
Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N=5760).

Again, there is a certain level of arbitrariness in deciding on where to set this threshold. Choosing a threshold of three or more indicators would identify 25.5 per cent of adults as experiencing multiple QoL deficits, while a threshold of four or more indicators would identify 13.9 per cent of the adults. Although the four-or-more threshold is closer to the poverty level which was used to set the thresholds on the individual items, identifying the larger group (25.5 per cent of adults) has the merit of making more cases available within subgroups (such as age groups or social

classes) for whom the AHCR could be decomposed. Therefore, we adopt the threshold of three or more here: someone experiencing problems on three or more of the indicators is regarded as having multidimensional quality of life problems.[8]

2.3.4 The relationship between the dimensions – censored and uncensored

Having decided on the threshold, we characterise multidimensional QoL problems for those above the threshold. This step involves what Alkire and Foster (2011a) describe as censoring the matrix. Those below the 3+ threshold are regarded as not experiencing multidimensional QoL problems and the score on the individual component dimensions is set back to zero. Dimension scores above 0 now relate only to those who are above the specified threshold for the requisite number of dimensions.

Here we explore the consequences for the relationships between our selected deprivation dimensions of moving to a censored approach. In other words, when we focus on the interrelationships between the dimensions as aspects of a multidimensional quality of life measure (problems on 3+ of the indicators), how does the relationship between the dimensions change compared to when we focus on the total population? In Table 2.3 we show the correlations between each of the dimensions. The uncensored outcomes are above the diagonal and the censored ones below.[9]

Focusing first on the uncensored correlations, we can see that the highest correlation of 0.47 is between financial strain and deprivation. Of the remaining correlations, only that between mental distress and health problems reaches 0.30. The average correlation is 0.11. Focusing on the uncensored correlations will inevitably lead to modest estimates of multiple deprivation.

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[8] We later discuss the results of a set of sensitivity tests designed to ensure that the conclusions are robust under the choice of different thresholds.
[9] The Pearson correlation coefficient shows the strength of the relationship between two indicators and ranges from 0 (no relationship) to 1 (perfect relationship).

Table 2.3: Correlation between the dimensions: censored below the diagonal and uncensored above the diagonal

		Uncensored correlation (above diagonal)										
		1. Income poverty	2. Deprivation	3. Financial strain	4. Health problems	5. Mental distress	6. Housing crowding problems	7. Housing quality problems	8. Neighbourhood problems	9. Institutional mistrust	10. Lack of social support	11. Lack of safety
Censored (below diagonal)	1. Income poverty		0.16	0.15	0.04	0.06	0.09	0.04	0.00	0.07	0.05	0.00
	2. Deprivation	0.31		0.47	0.16	0.26	0.14	0.18	0.10	0.17	0.14	0.07
	3. Financial strain	0.35	0.60		0.06	0.24	0.19	0.14	0.09	0.17	0.12	0.03
	4. Health problems	0.21	0.33	0.24		0.30	-0.05	0.08	0.08	0.10	0.13	0.19
	5. Mental distress	0.24	0.37	0.39	0.51		0.04	0.12	0.12	0.18	0.19	0.11
	6. Housing crowding problems	0.30	0.31	0.42	0.15	0.22		0.08	0.05	0.03	0.02	-0.04
	7. Housing quality problems	0.26	0.33	0.34	0.32	0.32	0.30		0.16	0.09	0.07	0.06
	8. Neighbourhood problems	0.19	0.27	0.31	0.33	0.35	0.26	0.39		0.10	0.04	0.13
	9. Institutional mistrust	0.24	0.32	0.36	0.31	0.37	0.22	0.30	0.33		0.11	0.08
	10. Lack of social support	0.15	0.22	0.22	0.29	0.32	0.13	0.21	0.16	0.23		0.04
	11. Lack of safety	0.15	0.19	0.18	0.37	0.29	0.11	0.25	0.35	0.26	0.14	

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N=5760).

Our expectation was that dimensions that may be loosely associated when we consider the population as a whole will be much more closely linked when the comparison with deficit scores above zero relate only to the multidimensionally disadvantaged. The findings in the lower diagonal of Table 2.3 confirm these expectations. We find a stronger pattern of correlation between dimensions for the censored scores. The highest correlation is 0.60 (between financial strain and deprivation) and the average is 0.28 which is over 2.6 times the average in the uncensored case.

2.3.5 The head count, intensity and AHCR

Three different indicators of the level of multidimensional disadvantage can be derived from the AHCR methodology, as illustrated in Table 2.4.

1. The head count H is the proportion of people who are experiencing multidimensional QoL deficits – the percentage experiencing 3 or more quality of life problems. As noted above, this is 25.5 per cent.

2. The intensity I is the average deficit score for those experiencing multidimensional QoL deficits – the proportion of the QoL indicators on which they experience a deficit. This is 37.1 per cent in the present case, indicating that those who are experiencing multidimensional QoL problems have problems on roughly one third of dimensions included, or just over 4 of the 11 indicators.

3. The adjusted head count ratio (AHCR) is the product of the head count and the intensity, which is 9.46 out of 100. This does not refer to a percentage of the population – that is what the head count does – but rather to a 'score' out of 100 that summarises both the level and intensity of multidimensional QoL deficits in the population.[10] A score of zero would indicate that no member of the population experiences problems with 3 or more of the QoL indicators. A score of 100 would indicate that all members of the population have problems with the maximum possible number of QoL indicators – a highly unlikely occurrence. The AHCR figure is particularly useful when comparing different groups in the population, as we do for age group and social class.

Table 2.4: Three Indicators of the level of multidimensional QoL problems

H: Multidimensional deprivation on quality of life (Head count, % of population with problems on 3+ QoL indicators)	25.5%
I: Multidimensional intensity	37.1%
AHCR: Multidimensional adjusted head count ratio (H x I)	9.46

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N=5760).

2.3.6 Decomposition of the overall score by indicator

As noted above, one of the strengths of the AHCR methodology is that it allows us to decompose the overall AHCR score for a population into the contribution made by the different dimensions. This is illustrated in Table 2.5. The contribution of each indicator is constrained so that they sum to 100. In interpreting the decomposition, it is worth remembering that because each person with multidimensional QoL problems has a deficit on at least 3 indicators, the maximum that any single indicator could contribute would be 33 per cent.

The figures in the table show the contribution of each type of deficit to the total number of deficits across all the individuals who are multidimensionally disadvantaged. So, poverty accounts for 7 per cent of the total, deprivation for 10 per cent and so on.

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[10] The AHCR could also be interpreted as the QoL problems experienced by the population as a percentage of the maximum possible across the eleven dimensions.

Table 2.5: Decomposition of the AHCR for multidimensional QoL problems

		Contribution	Rank
Material disadvantage	Income poverty	7.4%	9
	Deprivation	10.1%	6
Financial strain	Financial strain	11.2%	1
Health problems	Health problems	10.9%	3
Mental distress	Mental distress	11.1%	2
Housing problems	Housing crowding problems	8.2%	8
	Housing quality problems	10.1%	5
Neighbourhood problems	Local nuisance	10.5%	4
Institutional mistrust	Institutional mistrust	9.8%	7
Lack of social support	Lack of social support	4.3%	11
Lack of safety	Lack of safety	6.4%	10
Total		100%	

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N cases with problems on 3+ indicators = 1,497). Average margin of error on each percentage is plus or minus 0.9 per cent.

Seven of the indicators each contribute 10 to 11 per cent to the total ACHR: financial strain, mental distress, health problems, local nuisance, housing quality problems, deprivation and mistrust in institutions. Three indicators each contribute 6 to 8 per cent: crowding, income poverty and lack of safety. Lack of social support, which is not common in the population, contributes just 4 per cent. The contribution of each indicator to the total is a function of the extent to which the QoL problem occurs as part of a multidimensional QoL 'constellation'. The variation across indicators for the overall population is not large, but the decomposition is of more interest when we compare different groups.

Note that this decomposition is different from the percentage of the total population who are deprived on each indicator (i.e. above the individual indicator threshold), as shown in Table 2.2. For instance, in Table 2.2, 20.2 per cent of people had problems in terms of 'local nuisance'. This was not an indication that 'local nuisance' was a particularly significant aspect of multidimensional QoL, but arose because 20.2 was as close as we could get to the 15.2 per cent target threshold. In Table 2.5, we see that 'local nuisance' contributes 10.5 per cent to the total multidimensional QoL score, lower than mental distress and financial strain (both about 11 per cent). This

is because 'local nuisance' occurs somewhat less often as a component of multidimensional QoL problems than mental distress or financial strain.

2.4 Robustness checks

We conducted some additional analyses to ensure that the results of the AHCR analysis would not change substantially had we made different decisions regarding the thresholds to adopt in the construction of the indicator. The results are discussed in Appendix 2. In brief, the *overall* level of QoL problems and the contribution of the different dimensions are sensitive to the choice of multidimensional and item-specific thresholds, but the comparisons between groups, as discussed in the next section, remain very similar. Therefore, the strength of the method is in allowing comparisons between groups in both the level and composition of QoL problems.

2.5 Summary

In this section we described the construction of the AHCR measure of QoL problems, including the choice of indicators, the threshold adopted on each indicator, and the choice of the threshold for considering someone as having multidimensional QoL deficits. The main strength of the AHCR methodology is in allowing the comparison between groups both in terms of the level of deficits and the relative contribution of different types of problem to their QoL deficit 'package'. We illustrate this in the next section by presenting results for age groups and social classes.

3. Adjusted head count ratio by age group and social class

3.1 Introduction

In the previous section we described the measurement of the multidimensional indicator of QoL deficits. The description was detailed so that the logic of each stage could be made as transparent as possible. The real strength of the AHCR approach, however, is in how it permits comparisons between groups in terms of both the level and the composition of their disadvantage. Alkire and Foster (2011b) demonstrate that their methodology satisfies a range of desirable axiomatic properties. Of particular relevance here is decomposability in relation to dimensions and socio-economic groups. This means that it is possible to calculate the contribution of each dimension to the AHCR for different groups and the proportion of the total population AHCR accounted for by each socio-economic group (Whelan, Nolan and Maître, 2014).

We illustrate these strengths in this section by focusing on what the AHCR can tell us about the level and nature of quality of life problems by age group and social class. As in the previous section, we focus on the adult population who were interviewed directly (i.e. not by proxy), as this is the group for which the quality of life indicators in the SILC 2013 module are available.

3.2 Head count, intensity and AHCR by age group

In Table 3.1 we show the breakdown by age group of the three indicators of the level of multidimensional QoL deficits: H the head count for the multidimensional QoL indicator, I the mean intensity and AHCR the adjusted head count ratio which is the product of H by I. For reference, we also show the national measures of income poverty and basic deprivation.[11] In columns 4 and 5 we see the familiar pattern in relation to income poverty and basic deprivation, with levels tending to be higher for the younger age groups. The head count figures (H) in the first column indicates the percentage in each age group above the multidimensional QoL deficit threshold (problems on at least 3 indicators). This is similar to the pattern for poverty and deprivation in being higher for the younger than the older age groups. The level is 31

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[11] Note that basic deprivation involves an enforced lack of 2 or more of the 11 basic items, whereas the indicator of deprivation that forms part of the AHCR has a threshold of 4 or more of the same items.

per cent for adults under 30, between 25 and 27 per cent for adults aged 31 to 64, and 19 to 20 per cent for adults aged 65 and over.

Table 3.1: Level of multidimensional quality of life deficits, poverty and deprivation by age group

	Multidimensional Quality of Life Deficits				
	H: Head count	**I: Intensity**	**AHCR**	**Income poverty**	**Basic deprivation**
18 to 30	31%	37%	11.4	16.9%	35.9%
31 to 40	25%	37%	9.3	10.5%	29.1%
41 to 50	27%	39%	10.5	15.9%	32.4%
50 to 64	27%	37%	10.0	17.9%	28.9%
65 to 70	20%	33%	6.6	12.7%	18.7%
71 to 85	19%	34%	6.5	6.4%	14.6%
Total	26%	37%	9.4	14.0%	28.2%
Ratio of 18-30:71+	1.6	1.1	1.8	2.6	2.5

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N=5,691).

The second column (I) focuses on the average intensity level among those who have been identified as multidimensionally disadvantaged in terms of QoL. There is not a great deal of variation in this respect: among those with problems on three or more QoL indicators, the percentage of potential items lacked ranges from 33 per cent for the 65 to 70 age group to 39 per cent for the 41 to 50 age group.

In the third column we focus on the adjusted head count ratio (AHCR). Where no one in an age group experiences any of the problems it would take on a value of 0 and where every individual experiences disadvantage on the maximum number of items (11 in the sample of adults here) the value would be 100 per cent. Our observed range of values by age group ranges from 6.5 out of 100 for the over 70 age group to 11.4 out of 100 for those aged 18 to 30. As with the head count index, values generally decline with age. In interpreting these results it is important to remember that a score of 100 would indicate the highly implausible outcome that every individual is above the deprivation threshold on all of the dimensions.

The amount of variation in level of multidimensional QoL problems by age group is somewhat less that the variation in income poverty and basic deprivation. This can be seen in the last row, which shows the ratio between the rates for the youngest and the oldest age groups. This ratio is 1.6 for QoL Head count and 1.8 for the

AHCR compared to 2.6 for income poverty and 2.5 for basic deprivation. The lower range for QoL index arises because some dimensions of QoL are more of an issue for the younger age group and some for the older age group, as we shall see in the next section. Before looking at the different elements of QoL, however, we examine the contribution of each age group to the overall amount of QoL problems in the population. This is shown in Table 3.2.

The first column in Table 3.2 shows the percentage of all multidimensional QoL deficits accounted for by each age group whereas the second column shows the percentage of the adult population accounted for by each age group. Thus, the 18 to 30 year olds account for 15.2 per cent of the total QoL deficits but only 12.6 per cent of the population. At the other end of the age scale, those aged 65 to 70 account for only 5.3 per cent of the total multidimensional QoL problems and those over age 70 account for only 7.8 per cent. These age groups multidimensional QOL problems account for 7.5 per cent and 11.4 per cent of the population, respectively.

Table 3.2: Decomposition: per cent of total multidimensional deficits accounted for by each age group

Age group	Contribution to total Multidimensional QoL Deficits	% of adults in this age group
18 to 30	15.2%	12.6%
31 to 40	22.0%	22.4%
41 to 50	22.1%	19.9%
51 to 64	27.7%	26.2%
65 to 70	5.3%	7.5%
71 to 85	7.8%	11.4%
Total	100%	100%

Source: SILC 2013, analysis by authors. Population aged 18-85 with data from direct interview. (N persons = 5,691; N persons multidimensionally disadvantaged =1458).

The three middle age groups (31 to 40, 41 to 50 and 51 to 64) are much closer to accounting for a fraction of QoL deficits that is proportional to their population size. It is clear that younger adults account for a higher share of the total multidimensional QoL deficits than their representation in the population would lead us to expect.

3.3 Decomposition of multidimensional QoL by dimension

One of the advantages of the adjusted head count ratio measure is that it is decomposable in terms of dimensions of QoL. The overall ratio is equal to the average of the adjusted ratios for the individual dimensions. Similarly, the

percentage contribution of a given dimension to overall multidimensional QoL deficits is its weighted ratio divided by the overall ratio. In the present case, since we have applied equal weights to the eleven indicators, this simply involves dividing the dimension-specific ratio by the number of dimensions before dividing by the overall ratio so that the sum across dimensions is one (or 100 per cent).

In Figure 3.1 and Table 3.3 we show the decomposition of the AHCR for each age group. Note that the decomposition by dimension does not refer to the number of adults in each age group who have problems on that dimension. Rather, it shows the contribution of each dimension to the overall QoL deficit 'package' (or AHCR) of adults in each age group who have multidimensional QoL problems. In other words, in Figure 3.1, housing quality problems account for roughly ten per cent of QoL deficits. This indicates that 10 per cent of the multidimensional QoL deficits are accounted for by problems with housing quality. The decomposition shows the relative importance of the different dimensions where the person has multidimensional QoL problems.

The indicators are sorted so that those that do not vary very much by age group are at the bottom of the chart (top of the table), followed by those that tend to be more important for younger adults and with the dimensions that are more significant for older adults at the top of the chart (bottom of the table). Problems with housing quality, mental distress and mistrust in institutions are of fairly similar significance across the age groups. A lack of social support tends to be more significant for those in their middle years (5 to 6 per cent) than for the youngest and oldest age groups (2 to 3 per cent).

Figure 3.1: Decomposition of multidimensional QoL problems (AHCR) by dimensions within age group
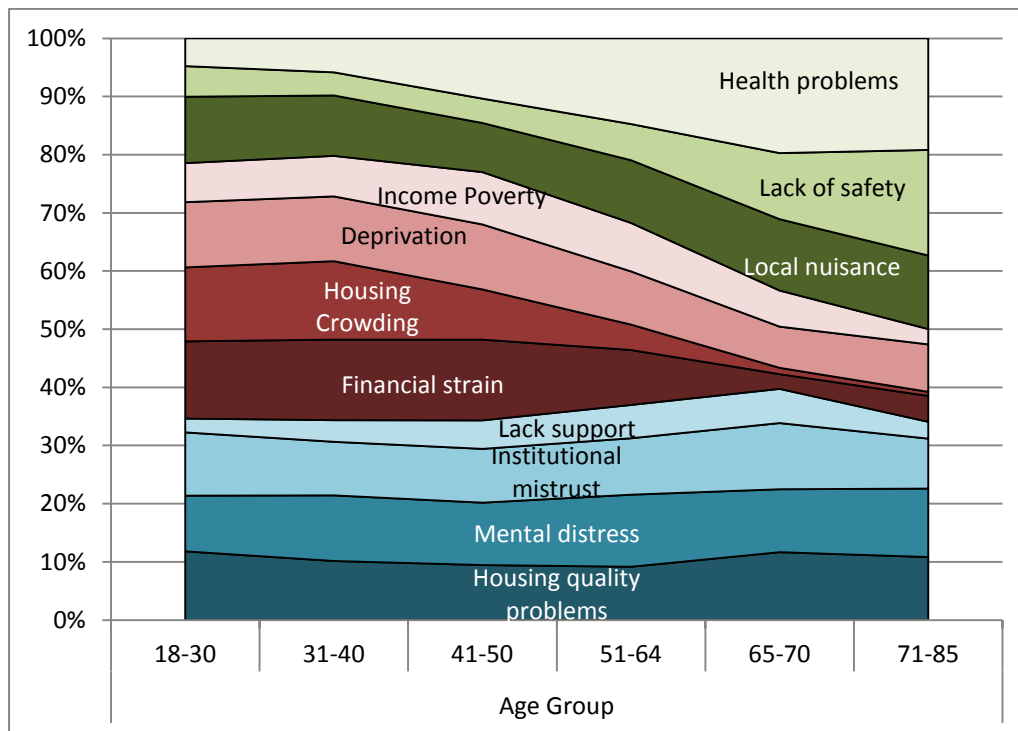
Source: SILC 2013, analysis by authors. Population aged 18 to 85 with data from direct interview. N persons multidimensionally disadvantaged =1,458 with between 110 (age 65-70) and 364 (age 51-64) in each age group.

Table 3.3: Dimensional decomposition of multidimensional QoL (AHCR) by age group

	Age Group					
	18 - 30	31 - 40	41 - 50	51 - 64	65 - 70	71 - 85
Housing quality problems	12%	10%	9%	9%	12%	11%
Mental distress	10%	11%	11%	12%	11%	12%
Institutional mistrust	11%	9%	9%	10%	11%	9%
Lack of social support	2%	4%	5%	6%	6%	3%
Financial strain	13%	14%	14%	9%	3%	4%
Housing crowding problems	13%	13%	9%	4%	1%	1%
Deprivation	11%	11%	11%	9%	7%	8%
Income poverty	7%	7%	9%	8%	6%	3%
Neighbourhood problems	11%	10%	8%	11%	12%	13%
Lack of safety	5%	4%	4%	6%	11%	18%
Health problems	5%	6%	10%	15%	20%	19%
Total	100%	100%	100%	100%	100%	100%

Source: SILC 2013, analysis by authors. Population aged 18 to 85 with data from direct interview. N persons multidimensionally disadvantaged =1,458 with between 110 (age 65-70) and 364 (age 51-64) in each age group.

Housing crowding and quality problems, deprivation and financial strain form a larger component of the multidimensional QoL deficit package of younger adults. Crowding, in particular, declines very sharply with age, accounting for less than 4 per cent of

the QoL problems after the age of 50 and 1 per cent after age 65, compared to 13 per cent among younger adults.

Finally, health problems, local nuisance and lack of safety are more significant for the oldest age group. Among those over age 65, poor health accounts for 19 – 20 per cent of multidimensional QoL problems. In the oldest age group, feeling unsafe in the local area is almost as important, at 18 per cent. Poor health and lack of a sense of safety are of much less significance for younger adults, accounting for just 5 per cent each of multidimensional QoL problems for those under age 30.

3.4 Social class variation in multidimensional QoL deficits

At this point we explore the extent to which multidimensional QoL varies by social class. The social class measure is the European Socio-Economic Classification (ESeC) (Rose and Harrison, 2010). This is a classification designed to identify groups with broadly similar life-chances related to their occupational position. We take the social class position of the person responsible for the accommodation to characterise the social class position of all members of the household. If a couple is responsible for the accommodation, the higher of their social classes is likely to be most consequential for the life chances of the household, and this is attributed to all household members. The social class categories are grouped into four, as follows:

1. Professional/managerial (ESeC classes 1 and 2): includes higher and lower professionals, managers and employers of 10 or more employees;
2. Intermediate (ESeC classes 3 and 6): includes the intermediate service class and technical workers;
3. Self-employed/farm (ESeC classes 4 and 5): self-employed & small employers of 9 or fewer employees, including self-employed farmers; and
4. Manual/lower (ESeC classes 7, 8, 9 and 10): includes skilled, semi-skilled and unskilled manual workers, routine occupations, lower service/sales occupations and those who never worked.

As in the previous section, we begin by presenting the overall level of QoL deficits, using the three measures (head count, intensity and AHCR) as well as the poverty and deprivation levels, for reference. Table 3.4 shows the three indicators of the level of multidimensional QoL problems by social class: the head count, the intensity and the adjusted head count ratio. The adjusted head count ratio clearly performs as expected in varying systematically by social class. The range of variation for the

index runs from 5 out of 100 for the higher professional/ managerial class to 14 out
of 100 for the manual/lower class.

The ratio of the rate for the manual/lower class to the professional/ managerial class
is 2.6 for the QoL head count and 2.8 for the AHCR compared to 3.4 for income
poverty and 2.3 for basic deprivation. The variation in the level of multidimensional
QoL problems by social class is greater than it was by age group. In the case of age
groups, the ratio of the AHCR of the youngest to the oldest age group was 1.8.

**Table 3.4: Level of multidimensional quality of life deficits, poverty and deprivation by
social class**

	Multidimensional QoL Deficits			Income poverty	Basic deprivation
	H: Head count	I: Intensity	AHCR	Income poverty	Basic deprivation
Professional/managerial	14%	35%	5	6%	17%
Intermediate	27%	37%	10	11%	28%
Self-employed, farm	29%	36%	10	24%	29%
Manual/lower	36%	38%	14	21%	40%
Total	25%	37%	9	14%	28%
Ratio of manual/lower to professional/managerial	2.6	1.1	2.8	3.4	2.3

Source: SILC 2013, analysis by authors. Population aged 16+ with data from a direct interview (N=5,827). N
cases with 3+ QoL problems: 1,494.

The QoL head count and AHCR for those in the self-employed /farming social class
are more similar to the relative level of basic deprivation than the relative level of
income poverty. In the case of the QoL and basic deprivation, the level for the self-
employed/farm social class is similar to that for the intermediate social class and
towards the middle of the range across classes. However, the income poverty rate is
the highest across the social classes at 24 per cent for the self-employed/farm class.
This high level of income poverty is known to reflect difficulties in the accurate
measurement of income for the self-employed (e.g. Parker, 2004; Hurst, Li and
Pugsley, 2014). Their level of basic deprivation is close to that of the intermediate
social class (29 and 28 per cent, respectively) and this is also true of their AHCR
ratio (10 per cent for both groups) and QoL head count (27 to 29 per cent).
In Table 3.5 we show the contribution of each social class to the overall amount of
QoL problems in the population. The first column shows the percentage of all
multidimensional QoL deficits accounted for by each social class while the second
column shows the percentage of the adult population in each social class. The

professional/managerial social class accounts for 39 per cent of adults but only 20 per cent of multidimensional QoL problems among adults. The manual/lower class account for a similar proportion of adults (37.4 per cent) but a much greater proportion of all QoL deficits at 55 per cent. The intermediate social class and the self-employed/farm social class are much closer to accounting for a share of QoL deficits that is proportional to their population size.

Table 3.5: Decomposition of multidimensional QoL deficits by social class

	Contribution to total Multidimensional QoL Deficits	% of adults in this social class
Professional/managerial	19.9%	38.8%
Intermediate	14.0%	13.3%
Self-employed, farm	11.6%	10.6%
Manual/lower	54.5%	37.4%
Total	100%	100%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons = 5,827; N persons multidimensionally disadvantaged = 1,494.

3.5 Decomposition of multidimensional QoL by dimension within classes

The final table and figure in this section decomposes the AHCR by dimension within social class (Table 3.6 and Figure 3.2). As noted above, the decomposition does not refer to the percentage of adults in each social class experiencing each type of QoL problem, but to the contribution of each QoL problem to the total deficit 'package' of the adults in this class who have multidimensional QoL problems. In the case of the professional/managerial class, for instance, we know that they are less likely than the other social classes to experience multidimensional QoL problems, but the figure and table shows the contribution of each dimension among those who do experience three or more QoL problems.

Figure 3.2: Decomposition of multidimensional QoL by dimension within class
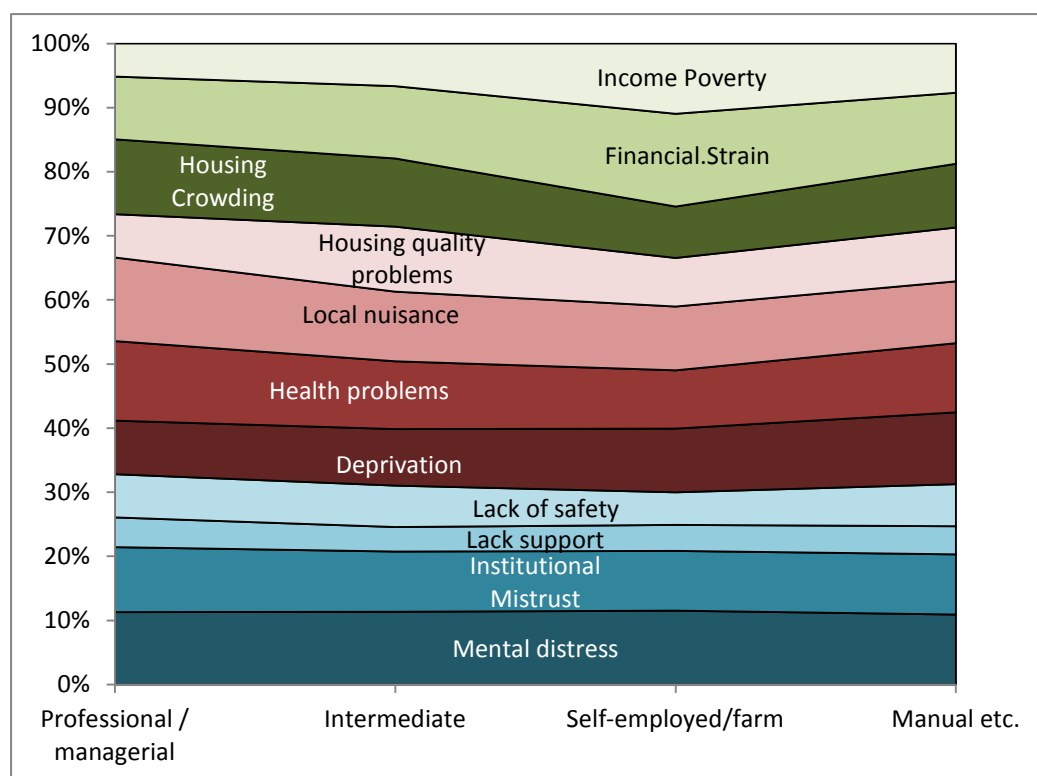
Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview. N persons with 3+ QoL problems =1,494, with 179 (self-employed/farm) to 805 (manual/lower) in each social class.

Table 3.6: Decomposition of multidimensional QoL by dimension within class

	Social Class			
	Professional/managerial	Intermediate	Self-employed, farm	Manual / lower
Mental distress	11%	11%	12%	11%
Institutional mistrust	10%	9%	9%	9%
Lack of social support	5%	4%	4%	4%
Lack of safety	7%	6%	5%	7%
Deprivation	8%	9%	10%	11%
Health problems	12%	11%	9%	11%
Neighbourhood problems	13%	11%	10%	10%
Housing crowding problems	7%	10%	8%	8%
Housing quality problems	12%	11%	8%	10%
Financial Strain	10%	11%	14%	11%
Income poverty	5%	7%	11%	8%
Total	100%	100%	100%	100%

Source: SILC 2013, analysis by authors. Persons aged 16 and over on whom we have data from a direct interview; 1,494 persons with 3+ QoL problems; with 179 (self-employed/farm) to 805 (manual/lower) in each social class.

What is perhaps most striking in the chart and table is that, apart from financial strain and poverty, which are both higher for the self-employed/farm social class, the

variation by social class is rather modest. We have seen that there are substantial differences by social class in the *level* of multidimensional QoL deficits. However, among those with problems on three or more QoL indicators, the pattern of deficits by social class is fairly uniform, in contrast to the larger differences by life-cycle stage.

There are some differences, although not as marked as the differences between age groups. When the professional/managerial social class experiences multidimensional QoL deficits, poverty and housing quality problems are somewhat less significant than they are for other social classes. For the manual/lower social class who are multiply deprived, problems with the deprivation are somewhat more important.

When the intermediate non-manual social class experiences multiple deprivation, dwelling quality problems are also important. Among the self-employed/farm social class who are multidimensionally disadvantaged, as noted above, financial strain is the most important element, accounting for 14 per cent of the total. Income poverty is also relatively important for this group, at 11 per cent compared to 5 to 8 per cent for the other social classes.

The relative importance of mental distress, mistrust in institutions, lack of social support and feelings of safety do not vary much by social class.

3.6 Summary

In this section we illustrated the use of the AHCR methodology by looking at differences by age group and by social class in the level and composition of multidimensional QoL problems. We found differences in the level of multidimensional QoL problems by both age group and social class, but a more distinct patterning of the components of multidimensional QoL by age than by class.

4. Conclusions and implications

4.1 Introduction

This paper fits with the tradition in ESRI research of developing multidimensional indicators of complex social phenomena in order to both identify the affected groups and characterise some of the complexity of their experience. In the context of the failure of current disposable income to identify those experiencing deprivation, ESRI researchers developed the concepts of basic deprivation and consistent poverty to take account of both living standards and income poverty (Nolan and Whelan, 1996).

Later work (Burchardt et al., 2002; Nolan and Whelan, 2007) sought to address what were seen to be key issues relating to the multidimensionality of exclusion and inclusion but to do so in a critical fashion. The academic and policy debates on such methodological approaches have focused on the value of summary indices for communication to a wide audience versus the potentially arbitrary nature of the decisions required in combining distinct dimensions. A number of authors have questioned whether acceptance that poverty is multidimensional necessarily implies a need for a multidimensional poverty index. Ravallion (2011) concludes that it is one thing to recognize that something is missing from a given measure and quite another to conclude that what is required is a single composite index. Nolan and Whelan (2007) note that while a case can be made for a multidimensional approach in seeking to adequately measure, understand and respond to poverty, they are not the same case and one does not simply follow from the other. Thus as Whelan and Whelan (1995: 29) argue while no one would wish to deny that social exclusion arises from of a variety of processes or that it is experienced as involving a good deal more than an income deficit, an uncritical insistence on multidimensionality could paradoxically have the effect of obscuring the processes involved in generating social exclusion.

While the union and intersection approaches may be easy to understand, they can be particularly ineffective at separating the poor from the non-poor, with the former tending to identify implausibly large numbers as poor and the latter to capture small minorities. The complexities of the issues involved are such that there is clear value in exploring a variety of approaches. ESRI work in this area sought to compare and contrast multiple deprivation approaches which identify a set of distinct dimensions on which individuals are deprived and an approach employing latent class analysis

which identified distinct cluster of individuals who are distinguished not by their current circumstances but in terms of risk profiles. This latter approach is consistent with the notion that the social policy should focus on the risk factors contributing to social exclusion rather simply exclusion outcomes (Whelan and Maître, 2005).

Different perspectives offer varying insights into the multidimensional nature of social exclusion in relation to quality of life, researchers have used the same methodology as adopted here to look at variations in quality of life (QoL) across Europe. What all of these have in common is the need to come to terms with complex social realities in ways that allow us to identify the major risk factors and point to possible policy approaches to dealing with them.

In this paper, we used a technique called the 'adjusted head count ratio' or AHCR, developed by Alkire and Foster (2007, 2011a and b), in order to characterise multidimensional quality of life problems in the context of a body of work concerned with social exclusion. While the multiple deprivation and economic vulnerability (Whelan and Maître, 2005, 2006) approaches are technically different from the AHCR technique applied here, they are all ways of finding an intermediate path between the extremes of the union approach which would include those deprived on any dimension and the intersection approach which would include only those deprived on all dimensions. These more sophisticated approaches seek to avoid simplistic notions of multiple deprivation while highlighting the fact that negative outcomes across a range of dimensions are socially structured. The particular strength of the AHCR approach is to identify the population affected by multiple QoL problems but also to characterise important distinctions between groups in the 'package' of QoL problems they face.

In this section, we summarise the results of our analysis in this paper and note some implications for the further development of the AHCR methodology in the context of a focus on quality of life.

4.2 The AHCR methodology

4.2.1 Purpose of the AHCR methodology

The AHCR methodology was developed by Alkire and Foster (2007, 2011a and b) to measure poverty as a multidimensional construct. The goal of the method is to identify a group experiencing multidimensional disadvantage and to characterise the nature of their disadvantage in terms of the distinct dimensions that are significant for them. In this paper we applied the methodology to quality of life (QoL).

There are three different steps in the AHCR process. The first is to identify the dimensions to be included and how they are to be weighted. The second is deciding what threshold on each item counts as a quality of life deficit. The third step involves deciding on how many of the dimensions the person must experience problems in order to be considered multiply disadvantaged.

4.2.2 Identifying the dimensions of QoL

Drawing on the literature on quality of life, we identified eleven indicators of nine distinct dimensions. Although some dimensions had more than one indicator, they were kept separate because we anticipated that they were significant for different groups in the population or because they are likely to warrant different policy responses. The dimensions and indicators are:

1. Material disadvantage (two indicators, income poverty and deprivation);
2. Financial strain (one indicator composed of five items);
3. Health problems (one indicator, self-rated poor, bad or very bad health);
4. Mental distress (one indicator made up of five items);
5. Housing problems (two indicators: crowding and dwelling quality problems involving dampness or insufficient light);
6. Neighbourhood problems (one indicator of local nuisance involving noise, pollution or crime);
7. Institutional mistrust (one indicator of lack of trust in political system, legal system, police);
8. Lack of social support (one indicator based on lacking someone to talk to and inability to get help from others); and
9. Lack of safety (one indicator, feeling very unsafe walking in local area).

Each indicator was given equal weight so that, implicitly, the dimensions of material disadvantage and housing problems (each of which has two indicators) have a higher weight.

4.2.3 Identifying the threshold on the individual dimensions

The second step is to identify the threshold on the individual dimensions. Except in the simple case where the problem is either present or absent, there is a certain arbitrariness in deciding on the threshold. Following Whelan, Nolan and Maître (2014) and Watson, Maître and Kingston (2014) we took the overall income poverty rate in 2013 as a guide and we chose the threshold on each one that was as close as possible to the 2013 poverty rate of 15.2 per cent.

4.2.4 Identifying the threshold for multidimensionality

The third step involved deciding on how many of the dimensions the individual needed to be disadvantaged in order to be considered as having multidimensional QoL problems (as opposed to a problem on a single dimension). Again, we took the 2013 poverty rate as a guide and chose the threshold that would identify as close as possible to the 15.2 per cent. The choice was between a threshold of 3 or more which would identify 25.5 per cent of the population or 4 or more which would identify 13.9 per cent. We opted for the threshold of 3 or more because it would yield a larger group (25.5 per cent vs. 13.9 per cent) with more cases available for the analysis of differences in the relative importance of the dimensions by group. Finally we conducted some robustness analyses (results presented in Appendix 2) to check whether the findings would differ if alternative thresholds had been chosen on the individual indicators as well as for the overall multidimensional measure. Our results show that the pattern of differences between age groups or social classes in the level of QoL problems remains relatively consistent under alternative choices of thresholds.

4.3 Multidimensional QoL by age group and social class

We illustrated the use of the AHCR methodology by looking at differences by age group and by social class in the level and composition of multidimensional QoL problems. We found differences in the level of multidimensional QoL problems by both age and class, but a more distinct pattern of the components of multidimensional QoL by the former than by the latter.

We saw that overall levels of multidimensional QoL problems tended to be higher for younger adults, following a similar pattern to that for the national income poverty and basic deprivation indicators. Among younger adults who were multidimensionally deprived, housing crowding and quality problems, deprivation and financial strain tended to be more significant. When adults in the 30-50 age range experience multiple QoL disadvantages, financial strain, overcrowded accommodation and deprivation feature more strongly. Among older adults with multidimensional QoL problems, it is health problems, lack of safety and local nuisance that are the most significant issues.

In terms of differences by social class, we again saw that the level of multidimensional QoL problems by social class followed a similar pattern to that of basic deprivation. The AHCR was almost three times higher for the manual/lower social class than the professional/managerial class. While income poverty tended to be highest among the self-employed and farming class, both AHCR and basic deprivation for this class were close to the average. In contrast to the distinct QoL deficit profiles by age group, there was only a relatively small amount of variation in the contribution of different dimensions to the overall bundle of deficits experienced by each social class, once the focus is on those who are multiply disadvantaged. This suggests that the types of QoL deficits experienced by those with multiple QoL problems vary more by life-cycle stage than by social class.

4.4 Limitations and future research

In the present analysis, we were limited to items measured in the 2013 SILC quality of life module. Unlike the European Quality of Life survey which is explicitly designed to measure different dimensions of quality of life, there were no indicators of perceived social exclusion, perceptions of the quality of public services or involvement in community activities.

The focus on items measured at the individual level also meant that we did not include aspects of the general quality of society which are not well measured at the individual level and which do not vary across the adult Irish sample, such as the overall level of inequality (e.g. the Gini coefficient) and aspects of QoL which we could assume to be of general benefit (e.g. democratic institutions).

Another aspect of the focus here was our concern to develop a measure which would be useful in highlighting the specific experiences of different social risk groups and social classes. This meant that we limited ourselves to indicators that were meaningful for all life-cycle stages. It would not be possible to compare across life-cycle stages if we had included dimensions such as access to work, work-life balance and access to education.

Since the 2013 items were measured for adults interviewed directly (i.e. not by proxy), the analysis here did not include children. It would be possible to extend the coverage to include children in future work by assigning the AHCR score of the parents to children, as is already done with household level indicators such as poverty and deprivation. While this would not capture the specific experiences of children, it would be a worthwhile exercise because children's well-being is affected by household levels of poverty, economic vulnerability and by parental mental well-being (e.g. Watson, Maître, Whelan and Williams, 2014; Whelan et al. 2015; Watson, Maître and Whelan, 2012).

Earlier explorations of the data suggested that there is a trade-off between the number of dimensions included and the capacity to identify distinct patterns for different social risk groups or social classes. The more indicators that are included, the higher the number of problems that someone will need to have in order to be considered multiply disadvantaged (otherwise we identify an implausibly large group). As a greater number of disadvantages are required in order to be above the threshold, the less any particular dimension will account for in the decomposition analysis. For instance, the inclusion of very general indicators, such as overall dissatisfaction, tends to reduce our capacity to identify distinct patterns across social risk groups. If almost all of those who are multiply disadvantaged are dissatisfied, for instance, then the inclusion of this dimension reduces the usefulness of the information on the composition or pattern of dimensions for different groups.

4.5 Conclusions
4.5.1 Strength of the AHCR approach
There has been robust debate about the relative merits of an aggregate indicator such as the composite United Nations Development Programme (UNDP) Human Development Index versus the set of Millennium Development Goals, which avoid

such aggregation across dimensions, and a similar contrast can be drawn between the composite EU poverty reduction target and the EU's full suite of social inclusion indicators. Without arbitrating on the relative value of these alternatives, here we have emphasized that where a multidimensional index is constructed, there is much to be gained from adopting an approach with clearly understood axiomatic properties. Doing so allows one to evaluate the consequences of the measurement strategy employed for the levels of multidimensional deprivation found, the pattern of such deprivation and the associated socio-economic composition and risk profiles, essential in making an informed assessment of the strengths and weaknesses of the particular choices made.

The analysis here pointed to the usefulness of the AHCR approach to understanding QoL problems. The censoring method employed allows us to establish that while in the population overall deprivation components are relatively weakly associated, reflecting the complexity of factors contributing to varying outcomes, it is possible to identify a subset of the population for whom deprivation components are more closely interlinked.

However, the particular forms of clustering of deprivation that are experienced vary by socio-economic group. It is in terms of such forms of multiple deprivation and the overall risk of such deprivation that that socio-economic groups are distinguished rather than intensity or depth of deprivation. Thus rather than identifying one group characterised by generalised deprivation our analysis reveals a number of groups all whom can be described as multiply deprived but who are characterised by distinct deprivation profiles arising from varying underlying processes and which may require rather different policy responses.

The AHCR approach has allowed us to identify groups who had a high level of multidimensional disadvantage, to compare groups in terms of the intensity of their disadvantage and also to characterise the distinct profile of disadvantage associated with different life-cycle stages. In particular, we saw that housing crowding and quality problems, deprivation and financial strain were relatively more important for younger adults while health problems and a lack of safety were more significant for older adults. The distinction between levels and profiles of disadvantage allowed us

to both characterise the distinctive experiences of disadvantage across the life-cycle stages and also to identify the policy areas of particular relevance to them.

4.5.2 Distinctions between groups

The approach adopted here was to begin with an implicit equal weighting of the eleven indicators examined, by setting a threshold that was as similar as possible across the indicators. To the extent that we are able to accomplish this, the analysis could reveal important differences in the relative importance of each dimension for different groups that were more than an artefact of the measurement process. For instance, we saw that when older adults experience multidimensional QoL problems, crowding, financial strain, and deprivation are relatively unimportant but health problems and a lack of safety are very significant. For younger adults, on the other hand, financial strain and crowded accommodation were much more salient.

4.5.3 Significance of life-cycle stage

The analysis revealed that the overall level and intensity of QoL problems tended to be greater for younger than for older adults and that there were important differences between age groups in the composition of QoL problems. In particular, poverty, deprivation and financial strain were less salient as a component of QoL problems for older adults. The income poverty rate by age group is a pattern that has changed dramatically in Ireland over time. In the 1990s, for instance, the income poverty rate for older adults increased very rapidly because pension rates failed to keep up with wage increases in a growing economy. As a result, the income poverty rate for people living with a householder over age 65 was 2.2 times higher for those under 65 with no children (Whelan et al., 2003, Table 4.13). The incomes of pensioners tend to be quite close to the 60% of the median income poverty threshold so that small changes in the pension rate or in the poverty threshold (as wages rise or fall) can have a strong impact on the poverty rate of older adults. The basic deprivation rate has tended not to show a high level of disadvantage relative to younger adults, however (Whelan et al., 2003, Table 5.4). This is likely to be because older adults are at a life-cycle stage where their housing costs are lower because the mortgage term has been completed and because the pressures of meeting the financial needs of dependent children are no longer so pressing. Nevertheless, the results here indicated that health and health care are likely to be highly significant to their quality of life and that the issue of personal safety has also become more salient.

4.5.4 Significance of the recession

The analysis in this paper was based on data collected in 2013, a point where the Great Recession was beginning to recede and unemployment was falling very rapidly. The recession led to an increase in economic stress among groups that had hitherto been relatively protected, such as those in the intermediate social class and middle-income deciles (Whelan and Maître, 2008). The fact that income is measured on an annual basis could well lead to a certain level of mismatch between current quality of life and income measured with a lag at a time when income levels were likely to be changing rapidly for those who were moving from unemployment to employment in 2013. This might account for both the relatively strong contribution of financial strain and the relatively weaker contribution of income poverty as components of overall QoL deficits in the data here. Also, as we saw in the analysis here, financial strain was something that was particularly significant among the self-employed and small employers. As a result, it would be worth repeating the analysis at a different point in time before drawing firm conclusions on the relative importance of income poverty, financial strain, deprivation and the other dimensions to the quality of life of different groups.

4.5.4 Relevance to policy

From the perspective of policy, the analysis based on the AHCR allowed us to identify the groups for whom different quality of life dimensions were most pressing. It also allows us to identify the areas of policy that are likely to be most salient to improving the quality of life of different groups. For instance, we could see that the quality of life of older adults with multidimensional QoL problems would benefit from a focus on issues of health and the safety of the environment in which they live. We saw that financial strain and deprivation were more salient issues at earlier stages of the life-cycle and that crowding was a particular issue for younger adults.

4.5.5 Extensions of the present analysis

Based on the analysis here, we would recommend further work exploring how different social groups face distinct QoL challenges. This could be done for groups of interest to policy such as young adults, lone parents and people with a disability as well as the different social classes and life-cycle stages. The analysis could be extended to children by assigning them the score of the parents, as is already done in the case of poverty and deprivation. In addition, we would recommend a more

focused analysis of differences within broad life-cycle groups that would allow the inclusion of dimensions that are difficult to measure on a comparable or equivalent basis across the entire age spectrum. In this regard, a focus on the working-age population would allow the inclusion of dimensions such as quality of work, work-life-balance and household joblessness while a focus on young adults would allow the inclusion of indicators related to education.

Appendix 1: Technical appendix for adjusted head count ratio[12]

A1.1 Identification

Deprivation thresholds: A vector $z = (z_1, ..., z_d)$ of deprivation thresholds (one for each dimension) is used to determine whether a person is deprived. Assuming that higher scores on dimension j indicate greater levels of disadvantage, if the person's level on a given dimension j is above the respective deprivation threshold z_j, the person is said to be deprived on that dimension; if the person's level is below the deprivation threshold, the person is not deprived in that dimension.

Weights: A vector $w = (w_1, ..., w_d)$ of weights is used to indicate the relative importance of the different dimensions. If each deprivation is viewed as having equal importance, then this leads to a benchmark case where all the weights are one and sum to the number of dimensions d.

Deprivation counts: A column vector $c = (c_1 ... c_n)$ of deprivation counts reflects the breadth of each person's deprivation.

Multidimensional QoL threshold: A deprivation count threshold k satisfying $0 < k \leq d$ is used to determine whether a person has sufficient deprivations to be considered as having multidimensional QoL problems.

Identification function: The identification function indicates whether a person is multidimensionally deprived in QoL, given deprivation thresholds z, weights w, and multidimensional QoL threshold k. If the person is multidimensionally deprived in QoL, the identification function takes on a value of 1; if the person is not multidimensionally deprived in QoL, the identification function has a value of 0.

A1.2 Censored matrices

The achievement matrix Y shows the achievement of n persons in each of the dimensions. The deprivation matrix G_o replaces each entry in Y that is above the deprivation threshold (assuming high values indicate greater deprivation) with the deprivation value w (1 for equal weights) and each entry that is not above the deprivation threshold with a zero. The censored deprivation matrix $GO(k)$ multiplies each row in the deprivation matrix by the identification function: if the person is multidimensionally deprived in QoL, the row remains unchanged; if not, the values in the rows are replaced with zero.

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[12] This discussion draws on Section 5 of Alkire et al. (2015)

A1.3 Aggregation: The adjusted head count ratio

The adjusted head count ratio denoted as M_0 *(X;z)* is the mean of the censored deprivation score vector:

Equation 1.1:

$$M_0 = \mu(c(k)) = \frac{1}{n} \times \sum_{i=1}^{n} c_i(k)$$

A second way of viewing M_0 is in terms of partial indices. It can be written as the product as two partial indices. The first *H* is the percentage of the population that is multidimensionally deprived, or the multidimensional head count ratio or the incidence of multiple QoL deprivation. The second *A* is the intensity of multidimensional QoL deprivation, then

Equation 1.2:

$$M_{0=H\times A}$$

The head count ratio *H* is defined as *H=H (X;z)=q/n*, where *q* is the number of persons identified using the dual cut-off approach. In turn, intensity is the average deprivation score across the person so identified.

In sum then, Equation 1.3:

$$M_0(X;z) = \mu\big(c(k)\big) = H \times A = \frac{q}{n} \times \frac{1}{q}\sum_{i=1}^{q} c_i(k) = \frac{1}{n}\sum_{i=1}^{n} c_i(k) = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{d} w_j g_{ij}^0(k)$$

As a simple product of two partial indices *H* and *A*, the measure M_0 is sensitive to incidence and intensity of multidimensional QoL deprivation. It satisfies dimensional monotonicity, since if a multidimensionally deprived person becomes deprived in an additional dimension then *A* rises and so does M_0. Another interpretation of M_0 is that it estimates the share of weighted deprivations experienced by the poor divided by the maximum possible deprivations that could be experienced if all people were deprived on all dimensions.

Appendix 2: Robustness checks

A2.1 Introduction

In Section 2 we noted that there was a certain arbitrariness in the choice of threshold on the individual indicators and the multidimensional threshold. The thresholds on the individual indicators are used to determine whether a person was considered 'deprived' or 'having a problem' with respect to that indicator. The multidimensional threshold is the number of deprivations or problems the person must have in order to be considered as having multidimensional QoL problems.

In this section we report the results of some robustness checks conducted to establish whether the results of our analysis would differ substantially if different thresholds had been chosen at each stage. We know that the choice of threshold, both on the individual indicators and the multidimensional threshold, will influence the *overall* level of multidimensional deprivation: it will be higher if a more lenient threshold is chosen. Our concern here is to assess the impact of the choice of threshold on the *comparison* between age groups and social classes in terms of the level and composition of multidimensional QoL problems.

A2.2 Choice of multidimensional threshold

In Section 2, we chose the threshold of having problems on 3 or more of the eleven indicators for the purpose of identifying those who were multidimensionally deprived. Here we examine the consequences of choosing alternative multidimensional thresholds: 2 or more and 4 or more. The results, in terms of the measures of the level of multidimensional QoL disadvantage, are shown in Table A2.1.

Requiring a lower threshold (2 or more) in order to be considered multidimensionally deprived would result in a higher head count but a lower intensity. Overall, the AHCR would be somewhat higher (12.7 per cent compared to 9.5 per cent at a threshold of 3 or more). Requiring a stricter threshold of 4 or more would result in a lower head count but a higher intensity and an overall AHCR that is lower at 6.3 per cent.

In general as can be seen in the AHCR by age group and by social class, the patterns across age and social class are very similar under the different multidimensional thresholds. The levels are highest for the youngest adults and lowest for the oldest adults. In social class terms, the levels are highest for the manual/lower social class and lowest for the professional/managerial social class. The AHCR for the self-employed/farm social class is close to that for the intermediate social class under the different thresholds.

Table A2.1: Impact on AHCR of choice of multidimensional threshold

		Multidimensional Threshold		
		2+	3+	4+
Total	Head count (% above threshold)	43.6%	25.5%	13.8%
	Intensity (% of indicators)	29.2%	37.1%	45.3%
	AHCR	12.7%	9.5%	6.3%
Age groups AHCR	18 - 30	15.0%	11.4%	7.8%
	31 - 40	12.2%	9.3%	6.1%
	41 - 50	13.6%	10.5%	7.4%
	51 - 64	13.1%	10.0%	6.8%
	65 - 70	10.4%	6.6%	3.3%
	71 - 85	10.1%	6.5%	3.5%
Social Class	Professional/managerial	7.6%	4.8%	2.8%
AHCR	Intermediate	13.0%	10.0%	6.8%
	Self-employed, farm	13.9%	10.4%	6.8%
	Manual/lower	17.7%	13.8%	9.6%
Ratios	Age ratio (age 18-30 : age 71-85)	1.5	1.8	2.2
	Class ratio (Manual/lower : Professional/managerial)	2.3	2.8	3.5

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons multidimensionally disadvantaged = 2,554 at 2+; 1,497 at 3+ and 817 at 4+).

There are some differences, however, in the gaps between groups under the different thresholds. The more lenient 2+ threshold that brings in a higher proportion of the population results in a slightly smaller gap (when expressed as a ratio, as shown in the last two rows) between the group or class with the highest and the group or class with the lowest AHCR. As we move from a threshold of 2+ to 3+ and 4+ the ratio of the rate for young to old adults increases from 1.5 to 1.8 and 2.2, respectively. The corresponding ratios for the manual/lower class to the professional/managerial social class are 2.3, 2.8 and 3.5, respectively. In other words, the general pattern of level of multidimensional deprivation by age and social class is similar but the gaps between the age groups and classes are larger when a stricter threshold is taken.

A second concern is whether the composition of multidimensional deprivation, in terms of the relative importance of the different indicators, changes when a different threshold is used. This is explored in Table A2.2 with respect to the choice of multidimensional threshold (2+, 3+ or 4+). In general, there is a good deal of stability under the different thresholds. At the stricter 4+ threshold which captures those with

more intense multidimensional disadvantage, deprivation and financial strain become somewhat more important and health, crowding, local nuisance and housing quality problems become somewhat less important than with the more lenient 2+ threshold. In other words, when we focus on the group with the most intense quality of life problems (i.e. a greater number of problems), deprivation and financial strain become somewhat more significant while health, housing and neighbourhood issues become slightly less central.

Table A2.2: Decomposition of multidimensional QoL by dimension with different multidimensional thresholds

	Multidimensional Threshold		
	2+	**3+**	**4+**
Income poverty	7.8%	7.4%	7.2%
Deprivation	8.7%	10.1%	11.0%
Financial strain	10.1%	11.3%	12.3%
Health problems	11.7%	10.9%	10.0%
Mental distress	10.3%	11.1%	11.5%
Housing crowding problems	9.1%	8.2%	7.6%
Housing quality problems	10.7%	10.1%	9.6%
Neighbourhood problems	11.3%	10.5%	10.1%
Institutional mistrust	9.5%	9.6%	9.9%
Lack of social support	3.9%	4.3%	4.7%
Lack of safety	7.0%	6.4%	6.1%
Total	100%	100.0%	100%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons multidimensionally disadvantaged = 2,554 at 2+; 1,497 at 3+ and 817 at 4+).

We also checked the decomposition of dimensions by age group and social class (Tables A2.3 and A2.4). The differences by age group remain very similar under different thresholds: deprivation, financial strain and crowding are most significant for younger adults while health, lack of safety and local nuisance are more significant for older adults. The other dimensions show less variability by age.

Table A2.3: Decomposition of multidimensional QoL by age group with different multidimensional thresholds

		Age Group					
		18 - 30	31 - 40	41 - 50	51 - 64	65 - 70	71 - 85
2+	Income poverty	7.8%	6.8%	9.0%	9.1%	7.3%	3.9%
	Deprivation	10.0%	9.5%	10.0%	8.1%	5.9%	5.8%
	Financial strain	12.3%	12.8%	13.3%	8.1%	2.9%	3.3%
	Health problems	4.5%	5.8%	9.9%	15.7%	21.8%	22.2%
	Mental distress	8.5%	10.2%	10.7%	11.5%	10.1%	9.7%
	Housing crowding problems	14.2%	15.9%	9.6%	4.9%	1.2%	0.9%
	Housing quality problems	12.1%	11.1%	9.4%	10.4%	10.2%	10.9%
	Neighbourhood problems	12.3%	11.9%	9.9%	11.0%	11.3%	11.6%
	Institutional mistrust	11.1%	9.0%	9.3%	9.6%	10.8%	9.1%
	Lack of social support	2.3%	3.2%	4.5%	5.1%	5.3%	2.6%
	Lack of safety	4.9%	3.8%	4.3%	6.5%	13.4%	20.0%
	Total	100%	100%	100%	100%	100%	100%
3+	Income poverty	6.7%	7.0%	9.0%	8.3%	6.2%	2.6%
	Deprivation	11.2%	11.1%	11.2%	9.2%	7.1%	8.2%
	Financial strain	13.3%	13.9%	13.9%	9.5%	2.5%	4.5%
	Health problems	4.8%	5.8%	10.4%	14.7%	19.7%	19.2%
	Mental distress	9.6%	11.3%	10.7%	12.4%	10.8%	11.8%
	Housing crowding problems	12.7%	13.5%	8.6%	4.4%	1.1%	0.7%
	Housing quality problems	11.8%	10.2%	9.5%	9.2%	11.7%	10.8%
	Neighbourhood problems	11.4%	10.4%	8.4%	10.8%	12.3%	12.6%
	Institutional mistrust	10.9%	9.2%	9.3%	9.7%	11.4%	8.6%
	Lack of social support	2.4%	3.7%	4.9%	5.7%	5.9%	2.9%
	Lack of safety	5.3%	4.0%	4.2%	6.2%	11.4%	18.2%
	Total	100%	100%	100%	100%	100%	100%
4+	Income poverty	6.5%	6.5%	9.7%	7.0%	4.7%	2.7%
	Deprivation	12.6%	12.0%	11.8%	9.2%	8.1%	10.6%
	Financial strain	14.2%	14.5%	13.8%	10.3%	4.7%	6.8%
	Health problems	5.2%	6.2%	10.4%	13.2%	15.2%	16.9%
	Mental distress	9.4%	12.4%	11.4%	12.9%	12.9%	10.2%
	Housing crowding problems	11.4%	11.4%	8.1%	4.0%	0.9%	0.3%
	Housing quality problems	12.2%	9.1%	8.4%	9.2%	13.2%	9.6%
	Neighbourhood problems	9.9%	10.0%	7.6%	10.8%	14.6%	13.8%
	Institutional mistrust	10.8%	10.4%	9.6%	10.0%	9.4%	8.8%
	Lack of social support	3.0%	3.5%	5.1%	6.7%	5.0%	3.1%
	Lack of safety	4.7%	4.0%	4.1%	6.7%	11.5%	17.5%
	Total	100%	100%	100%	100%	100%	100%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons multidimensionally disadvantaged = 2,554 at 2+; 1,497 at 3+ and 817 at 4+).

With the more lenient 2+ threshold, the relative contribution of health problems and lack of safety to the QoL problems of older adults is increased compared to the stricter 4+ threshold, while the relative contribution of deprivation is reduced. This is because there is a larger group of older adults who are affected by health issues and safety concerns, beyond the group also experiencing deprivation. When we focus on the group with more severe QoL problems (i.e. with a higher number of QoL problems), deprivation and financial strain become more important.

When it comes to the social class pattern, as shown in Table A2.4, there is less variation in composition by class than by age group under all three thresholds (2+, 3+ or 4+) and the most noticeable difference between social classes remains the greater significance of financial strain and income poverty for the self-employed/farmers than for the other social classes.

In general, then, the robustness checks in this section indicated that the conclusions about age and social class differences in the level or composition of QoL deficits would be substantially similar under different choices of multidimensional QoL thresholds. The adoption of a stricter threshold, and the focus on a more severely deprived group in terms of QoL, would tend to lead to stronger differences by both age group and social class in the level of QoL problems. With different multidimensional thresholds, we see the same differences by age group in the relative importance of dimensions such as health and a sense of safety (more significant for the older age group) and deprivation, crowding and financial strain (more significant for younger adults).

Table A2.4: Decomposition of multidimensional QoL by social class with different multidimensional thresholds

		Social Class			
		Professional / managerial	Inter-mediate	Self-employed, farm	Manual/ lower
2+	**Income poverty**	5.4%	6.3%	11.0%	8.6%
	Deprivation	6.9%	8.1%	8.3%	9.7%
	Financial strain	8.5%	10.1%	13.9%	9.9%
	Health problems	12.4%	11.2%	10.8%	11.7%
	Mental distress	10.5%	11.1%	10.8%	9.9%
	Housing crowding problems	8.8%	11.0%	7.6%	9.1%
	Housing quality problems	12.5%	11.9%	8.7%	10.0%
	Neighbourhood problems	15.5%	10.4%	9.2%	10.0%
	Institutional mistrust	9.4%	9.3%	9.3%	9.6%
	Lack of social support	3.3%	3.6%	4.3%	4.1%
	Lack of safety	6.7%	6.9%	6.2%	7.4%
	Total	100%	100%	100%	100%
3+	**Income poverty**	5.2%	6.7%	11.0%	7.7%
	Deprivation	8.4%	8.8%	9.9%	11.2%
	Financial strain	9.8%	11.3%	14.5%	11.1%
	Health problems	12.4%	10.6%	9.1%	10.8%
	Mental distress	11.3%	11.4%	11.5%	10.9%
	Housing crowding problems	6.8%	10.2%	7.6%	8.4%
	Housing quality problems	11.7%	10.6%	8.0%	9.9%
	Neighbourhood problems	13.0%	10.9%	10.0%	9.7%
	Institutional mistrust	10.1%	9.4%	9.3%	9.4%
	Lack of social support	4.6%	3.8%	4.1%	4.4%
	Lack of safety	6.7%	6.5%	5.1%	6.6%
	Total	100%	100%	100%	100%
4+	**Income poverty**	4.8%	6.9%	11.3%	7.1%
	Deprivation	9.7%	9.5%	11.0%	11.8%
	Financial strain	10.9%	10.3%	15.5%	12.5%
	Health problems	11.7%	10.8%	7.0%	9.8%
	Mental distress	11.6%	11.8%	12.0%	11.3%
	Housing crowding problems	5.5%	8.9%	7.5%	7.9%
	Housing quality problems	10.5%	10.6%	7.4%	9.6%
	Neighbourhood problems	12.2%	11.2%	8.9%	9.5%
	Institutional mistrust	10.3%	9.5%	10.5%	9.8%
	Lack of social support	5.3%	4.6%	4.6%	4.5%
	Lack of safety	7.6%	6.0%	4.2%	6.1%
	Total	100%	100%	100%	100%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons multidimensionally disadvantaged = 2,554 at 2+; 1,497 at 3+ and 817 at 4+).

A2.3 Choice of threshold on the individual indicators

In Section 2, we discussed the choice of threshold on the individual indicators and, following Whelan, Nolan and Maître (2014), used the overall income poverty level as a yardstick. We chose a threshold on each item that would identify a percentage of the population as deprived on that indicator that was as close as possible to the overall percentage identified as income poor (15.2 per cent). We test an alternative threshold here: one that is as close as possible to the most disadvantaged 10 per cent of the population.

For some indicators (housing problems, safety and social support) the original threshold was as close as we could get to 10 per cent, as shown in column B in Table A2.5. Because of the coding of the variables and distribution of the responses, the next-closest percentage identified would have been even farther from 10 per cent or would have been exceptionally low. On the health item, for purposes of illustration, we selected a very low threshold: taking 'very bad' plus 'bad' as the threshold on self-rated health results in only 3.7 per cent of the population being identified as having a problem on this indicator. This will allow us to comment on how the choice of threshold on the individual indicators affects comparisons across groups.

Table A2.5: Alternative thresholds on the individual indicators

	Individual indicator threshold	
	A. Based on overall poverty level (15.2%, or as close as possible)	B. Based on the most disadvantaged 10% (or as close as possible)
Income poverty	14.6%	10.0%
Deprivation	13.0%	8.8%
Financial strain	16.0%	6.5%
Health problems	19.8%	3.7%
Mental distress	16.1%	11.8%
Housing crowding problems	17.3%	9.9%
Housing quality problems	18.2%	18.2%
Neighbourhood problems	20.2%	5.5%
Institutional mistrust	16.1%	10.6%
Lack of social support	6.7%	6.7%
Lack of safety	12.2%	12.2%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons=5,760).

The range in terms of the population identified is from 8.8 to 11.8 per cent on poverty, deprivation, distress, crowding and mistrust while the percentage identified is lower on financial strain (6.5 per cent), local nuisance (5.5 per cent), lack of support (6.7 per cent) and poor health (3.7 per cent). The threshold on the indicator

of housing quality problems is the highest (18.2 per cent), followed at some distance by the 'lack of safety' indicator, at 12.2 per cent. Both of these indicators remain at the level used previously, as shown in column A. However, since the thresholds on most of the other items were reduced, we would expect their relative impact on the overall composition of the AHCR to be greater. Since the main purpose of the robustness analysis was to check the impact on the conclusions of varying the thresholds, the strategy introduced enough variation to be informative in this regard.

Table A2.6 compares the overall level of multidimensional QoL problems, using the 3+ multidimensional threshold, for (A) the multidimensional indicator constructed with the 15.2 per cent target threshold on the individual indicators (as used in this report) and (B) the multidimensional indicator constructed with the alternative thresholds (from Table A2.5) on the individual items shown.

Table A2.6: Impact on AHCR of choice of individual item threshold at A. 15 per cent and B. close to 10 per cent (multidimensional threshold is 3+ for both)

		A. Poverty rate	B. 10%
Total	**Head count (% above threshold)**	25.5%	11.8%
	Intensity (% of indicators)	37.1%	35.0%
	AHCR	9.5%	4.1%
Age groups AHCR	**18 - 30**	11.4%	5.2%
	31 - 40	9.3%	4.1%
	41 -50	10.5%	4.7%
	51- 64	10.0%	4.2%
	65- 70	6.6%	2.3%
	71- 85	6.5%	3.0%
Social Class **AHCR**	**Professional/managerial**	4.8%	1.8%
	Intermediate	10.0%	4.2%
	Self-employed, farm	10.4%	4.4%
	Manual/lower	13.8%	6.4%
Ratios	**Age ratio (age 18-30 : age 71-85)**	1.8	1.7
	Class ratio (Manual/lower : **Professional/managerial)**	2.8	3.5

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons = 5,760).

As expected, adopting a stricter threshold on the individual indicators reduced the head count and AHCR. The intensity remains similar, however. The AHCR is reduced from 9.5 per cent of potential QoL problems to 4.1 per cent. This is not

surprising, as we have adopted a stricter definition of what counts as a QoL problem for eight of the items, as shown in Table A2.5.

Table A2.6 also shows the level of multidimensional QoL problems by age group and social class with the two alternative sets of thresholds on the individual items (and a multidimensional threshold of 3+ in both cases). For all age groups and social classes the level on the alternative AHCR is lower, in line with the overall difference under the two alternative thresholds. However the pattern of differences across the age groups and social classes are quite similar. Both AHCRs are lowest for the oldest age group and highest for the youngest age group and, in social class terms, lowest for the professional/managerial and highest for the manual/lower social class. The ratio between the AHCR for the youngest to the oldest age group remains very similar (1.7 vs. 1.8), despite the very big change in the threshold for health problems. The ratio between of the AHCR for the manual/lower to the professional/managerial social class is somewhat larger (3.5 vs. 2.8). This finding of larger social class differences as we increase the severity of deprivation (by adopting a stricter threshold on the individual items) parallels the pattern found in Table A2.1, above, of a larger social class difference as we moved from the more lenient 2+ to the stricter 4+ threshold on the multidimensional threshold.

Table A2.7 turns attention to the relative significance of the different dimensions as components of the AHCR. The table shows how the decomposition of the AHCR varies depending on whether we use (A) a threshold as close as possible to the poverty rate (15 per cent) or (B) a threshold as close as possible to 10 per cent. The multidimensional threshold in both cases is 3+: the person must have problems on three or more of the indicators in order to be considered multidimensionally deprived.

Table A2.7: Decomposition of multidimensional QoL by dimension by choice of individual indicator threshold: A. = Poverty rate and B. = close to 10 per cent, where possible (multidimensional threshold is 3+ for both)

	A. Poverty rate	B. 10 %
Income poverty	7.4%	7.9%
Deprivation	10.1%	11.4%
Financial strain	11.3%	8.5%
Health problems	10.9%	4.6%
Mental distress	11.1%	13.6%
Housing crowding problem	8.2%	7.1%
Housing quality problems	10.1%	14.4%
Neighbourhood problems	10.5%	6.0%
Institutional mistrust	9.6%	10.6%
Lack of social support	4.3%	6.5%
Lack of safety	6.4%	9.3%
Total	100.0%	100.0%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons = 5,760; N persons multidimensionally disadvantaged =1,494).

In terms of change in the composition of the AHCR, the dimensions with the largest changes are shown in bold. There is a substantial fall (from 11 to 5 per cent) in the relative contribution of poor health and also a fall in the relative contribution of financial strain (from 11 to 9 per cent). This is largely driven by the fact that these were the two items where the individual item threshold was changed the most (by 16 per cent and 9 per cent, respectively, as shown in Table A2.5). The relative contribution of housing quality problems has increased substantially (from 10 to 14 per cent). The threshold on this item was held at the same level under both A and B. Since this level was a good deal higher than for the other ten indicators (at 18 per cent compared to an average of 8.6 per cent across the other ten items, see Table A2.5) it is not surprising that its relative importance has increased.

Tables A2.8 and A2.9 show the results by age group and social class. The number of cases for the 65-70 age group has fallen below 100, so we do not show the decomposition for this group. The figures in Table A2.8 show that health problems and a lack of a sense of safety are more significant for the older than the younger adults, while financial strain and crowding show the opposite pattern. These are consistent with the results in Section 3 using the higher item-specific thresholds. The age difference in the significance of deprivation is less evident here than in the earlier analysis, however.

Table A2.8: Dimensional decomposition of multidimensional QoL by age with alternative item-specific thresholds

	Age Group				
	18 - 30	31 - 40	41 -50	51- 64	71- 85
Income poverty	7.0%	6.8%	9.5%	9.4%	2.9%
Deprivation	10.8%	11.3%	13.5%	10.5%	10.5%
Financial strain	8.5%	12.8%	10.5%	5.7%	3.9%
Health problems	1.6%	1.6%	4.5%	7.1%	9.5%
Mental distress	12.0%	14.7%	12.3%	14.6%	13.6%
Housing crowding problems	11.7%	12.0%	8.0%	2.2%	0.3%
Housing quality problems	17.2%	15.3%	11.9%	14.4%	11.6%
Neighbourhood problems	6.0%	6.3%	5.5%	6.0%	7.0%
Institutional mistrust	12.3%	8.9%	10.5%	11.0%	11.3%
Lack of social support	4.4%	4.8%	7.7%	9.3%	4.5%
Lack of safety	8.5%	5.6%	6.1%	9.6%	24.7%
Total	100%	100%	100%	100%	100%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons = 5,760; N persons multidimensionally disadvantaged =664). Decomposition not shown for the 65-70 age group because of small number of cases (<100).

The figures in Table A2.9 show that the social classes are more similar than the age groups in terms of composition. This is consistent with the pattern observed in Section 3 above with the higher thresholds on the individual indicators.

Table A2.9: Dimensional decomposition of multidimensional QoL by class with alternative item-specific thresholds

	Social Class			
	Professional / managerial	Inter-mediate	Self-employed, farm	Manual / lower
Income poverty	5.4%	8.0%	12.3%	7.8%
Deprivation	11.0%	11.0%	10.3%	11.8%
Financial strain	6.6%	9.3%	13.0%	8.1%
Health problems	5.3%	3.4%	3.4%	4.9%
Mental distress	14.2%	12.0%	14.3%	13.7%
Housing crowding problems	4.8%	9.9%	6.8%	7.3%
Housing quality problems	15.3%	15.4%	11.6%	14.4%
Neighbourhood problems	7.5%	5.2%	3.4%	6.2%
Institutional mistrust	12.4%	10.8%	11.5%	9.9%
Lack of social support	6.3%	7.0%	6.5%	6.4%
Lack of safety	11.3%	8.1%	6.8%	9.4%
Total	100%	100%	100%	100%

Source: SILC 2013, analysis by authors. Population aged 16 and over on whom we have data from a direct interview (N persons = 5,760; N persons multidimensionally disadvantaged =664).

A2.4 Summary of findings from the robustness checks

When we adopt a multidimensional understanding of QoL problems, the overall level of QoL problems varies depending on the choice of threshold. When a stricter threshold is chosen – either in terms of the individual indicators or in terms of the number of problems required before counting the person as multidimensionally deprived – the AHCR will tend to be lower. Nevertheless, the pattern of differences between age groups or social classes in the level of QoL problems remains relatively consistent. With different thresholds we still find the highest levels of QoL problems among younger adults and those in the manual/lower social class.

Looking at the contribution of the different types of QoL problem, we saw that the composition of QoL problems for the overall population is quite sensitive to differences in individual item thresholds. If the thresholds identify a smaller proportion of the population for one indicator, then that indicator will tend to contribute less to the total 'package' of QoL problems. As a result, if the different QoL problems differ in terms of the population identified because of the threshold chosen, caution is needed in drawing conclusions from the contribution to the total of each type of problem. However, differences in the relative contribution of different indicators across groups (e.g. the contribution of health problems or financial strain) is fairly robust vis-à-vis the choice of threshold on the individual items or choice of multidimensional threshold.

Appendix 3: Additional tables

Table A3.1: Quality of life items on the 2013 SILC (including module and core)

Group	Name	Target variable	Coding	Miss
2013 Module Items				
Overall experience of life	PW010	Overall life satisfaction	0=Not at all satisfied to 10=Completely satisfied	99
	PW020	Meaning of life	0 =Not worthwhile at all to 10=completely worthwhile	99
Material living conditions	PW030	Satisfaction with financial situation	0=Not at all satisfied to 10=Completely satisfied	99
	PW040	Satisfaction with accommodation	0=Not at all satisfied to 10=Completely satisfied	99
Mental /Emotional Health	PW050	Being very nervous	1 (all of the time) to 5 (none of the time)	9
	PW060	Feeling down in the dumps	1 (all of the time) to 5 (none of the time)	9
	PW070	Feeling calm and peaceful	1 (all of the time) to 5 (none of the time)	9
	PW080	Feeling downhearted or depressed	1 (all of the time) to 5 (none of the time)	9
	PW090	Being happy	1 (all of the time) to 5 (none of the time)	9
Productive and valued activities	PW100	Job satisfaction	0=Not at all satisfied to 10=completely satisfied	99
	PW110	Satisfaction with commuting time	0=Not at all satisfied to 10=Completely satisfied	99
	PW120	Satisfaction with time use	0=Not at all satisfied to 10=Completely satisfied	99
Governance and basic rights	PW130	Trust in the political system	From 0 (No trust at all) to 10 (Complete trust)	99
	PW140	Trust in the legal system	From 0 (No trust at all) to 10 (Complete trust)	99
	PW150	Trust in the police	From 0 (No trust at all) to 10 (Complete trust)	99
Leisure and social interactions	PW160	Satisfaction with personal relationships	0=Not at all satisfied to 10=Completely satisfied	99
	PW170	Personal matters (anyone to discuss with)	1=Yes; 2=No.	9
	PW180	Help from others	1=Yes; 2=No.	9
	PW190	Trust in others	From 0 (You do not trust any other person) to 10 (Most people can be trusted)	99
Natural and living environment	PW200	Satisfaction with recreational and green areas	0=Not at all satisfied to 10=Completely satisfied	99
	PW210	Satisfaction with living environment	0=Not at all satisfied to 10=Completely satisfied	99
Safety	PW220	Physical security	1=very safe to 4=very unsafe	9
See next page for additional Items from core SILC 2013 survey questionnaire				

Table A3.1: Quality of life items on the 2013 SILC (including module and core) contd.

Additional Items from core SILC 2013 survey questionnaire				
Health	Hlth_ stus	How is your health in general?	1 (Very good) to 5 (very bad)	
	Rooms	Number of rooms (excl. kitchenette, utility, bathroom, toilet, garage, business rooms)	(Combine with information on household size to calculate indicator of number of persons per room)	
	Bed-rooms	Number of bedrooms in dwelling	(Calculate indicator of number of persons per bedroom)	
	Space	Is there a shortage of space in the dwelling?	Yes or no	
Housing	Damp_ Walls	Problems with leaks or dampness	Yes or no	
Environment	Noise Pollution Crime	Problems in immediate area	Yes or no	
Financial strain		Difficulty making ends meet; housing costs burdensome; going into debt to meet ordinary living expenses; arrears on mortgage/rent or utility bills; and inability to save		

Source: SILC 2013 Manual

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Table A3.2: Quality of life items in the AHCR analysis (2013 module and core items)

Dimension	Indicators	Questions	Answers	Threshold
Financial strain	Difficulty making ends meet	"Concerning your household's total monthly or weekly income, with which degree of ease or difficulty is the household able to make ends meet?"	With great difficulty; With difficulty; With some difficulty; Fairly easily; Easily	Problems on at least 3 out of 5 of these items.
	Housing costs burdensome	"When you think of your household's total housing costs including payments on mortgage or rent, insurance and service charges (refuse removal, regular maintenance and repairs etc). Would you say they are":	A heavy burden ; Somewhat of a burden; No burden at all	
	Going into debt to meet ordinary living expenses	"Has the household had to go into debt within the last 12 months to meet ordinary living expenses such as mortgage repayments, rent, food, Christmas or back-to-school expenses?"	Yes; No	
	Arrears on mortgage/rent or utility bills	"In the last 12 months, did it happen that the household was unable to pay … … rent or to make a mortgage repayment for the main dwelling on time, due to financial difficulties? OR … utility bills (heating, electricity, gas, refuse collection) for the main dwelling on time, due to financial difficulties?"	Coded Yes; No; not applicable. Arrears if 'Yes' to either item.	
	Inability to save	"Can you save some of your income regularly? Income includes social welfare income or inter household transfer of money in addition to employment income."	Yes; No	
Health problems	Self-rated health	How is your health in general?	Very Good; Good; Fair; Bad; Very Bad	Fair to very bad
Mental distress	WHO 5-item	"How much of the time, during the past 4 weeks have you ... ... felt very nervous?" ... felt so down (in the dumps) that nothing could cheer you up?" ... felt calm and peaceful?" (Reversed) ... felt downhearted or depressed?" ... been happy?" (Reversed)	All of the time; Most of the time; Some of the time; A little of the time; None of the time	Sum of all standardised scores identifying as close to the most disadvantaged 15.2%
Lack of social support	Someone to talk to	"Do you have anyone to discuss personal matters with?"	Yes; No	Lacking at least 1 out of 2
	Can get help from others	"Do you have any relative, friends or neighbours that you can ask for help?"	Yes; No	
Lack of safety	Local area unsafe or very unsafe	How safe do you feel walking alone in your area after dark?	Very safe; Fairly safe; A bit unsafe; Very unsafe	Very unsafe

Table A3.2 (continued)

Dimension	Indicators	Questions	Answers	Threshold
Housing problems	**Overcrowding**	"How many rooms in the dwelling unit? "How many bedrooms in the dwelling?	Numeric value – number of persons per room & per bedroom. Sum of standardized scores.	Identifying as close as possible to top 15.2% of the distribution.
	Quality	Is there a shortage of space in the dwelling? Are there problems with leaks or dampness	Yes/No to each. Counting number of 'Yes' responses.	Yes to either one.
Neighbour-hood	**Living environment**	"Overall, how satisfied are you with … recreational facilities and green areas near your household (in the place where you live)? … with the quality of your living environment? … with your household accommodation?	Scale of 0 to 10 (where 0 means not at all satisfied and 10 means completely satisfied	Identifying as close as possible to the most disadvantaged 15.2% of the distribution.
	Local Nuisance	"Is ... ... noise from neighbours or noise from the street (traffic, business, factories etc) .... pollution, grime or other environmental ... problems in the area caused by traffic or industry ... ... crime, violence or vandalism in the area ... ... a problem for your household?	Yes; No on each item	Lacking at least 1 out of 3
Institutional mistrust	**Low level of trust in political, legal system and police**	How much do you personally trust … the political system? … the legal system? … the Gardaí (Police)?	Scale of 0 to 10 (where 0 means no trust at all and 10 means completely trust) for each item. Sum of scored	Identifying as close as possible to the most disadvantaged 15.2% of the distribution.
General dissatisfaction	**Dissatisfaction with life, time use, personal relationships and sense that life has no meaning**	Overall, how satisfied are you with … your life these days? … the amount of time you have to do the things you like doing? … your personal relationships?	Scale of 0 to 10 for each item (where 0 means not at all satisfied and 10 means completely satisfied),	Sum of scores, then Identifying as close as possible to the most disadvantaged 15.2% of the distribution.

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Glossary

Adjusted Head Count Ratio: Alkire and Foster (2007, 2011a and b) developed this approach to examine differences between groups in the level and pattern of multidimensional disadvantage. In other words, it goes beyond statements about whether one group has a greater overall level of disadvantage than another, to identify the particular aspects of life – access to material resources, social relationships, health and so on – on which different groups may be challenged.

At-risk-of-poverty thresholds: income thresholds derived as proportions of median income. These are based on the household income adjusted for household size and composition (referred to as equivalised income). A household at-risk-of-poverty has an adjusted (or equivalised) income below 60% of the median adjusted household income. The at-risk-of-poverty rate takes account of household income from all sources, number of adults and number of children in the household. There are some minor differences in the income concept and the equivalence scale between the Irish and EU measures of at-risk-of-poverty.

At-risk-of-poverty: a term used at EU level to denote whether a household's income falls below the 60% of median income threshold. It is also known as income poverty.

At risk of poverty or exclusion: this EU measure combines the number of people who experience at-risk-of-poverty or severe material deprivation or low work intensity. This measure is the basis for the Europe 2020 poverty target. In cases where people experience more than one of these indicators, they are counted only once. The Irish version of this measure is the combination of at-risk-of-poverty and basic deprivation.

Basic deprivation: people who are denied – through lack of income – at least **two items or activities on this index / list of 11** are regarded as experiencing relative deprivation. This is enforced deprivation as distinct from the personal choice not to have the items. Eleven basic items are used to construct the deprivation index:

- unable to afford two pairs of strong shoes

- unable to afford a warm waterproof overcoat

- unable to afford new (not second-hand) clothes

- Unable to afford a meal with meat, chicken or fish (vegetarian equivalent) every second day

- unable to afford a roast joint or its equivalent once a week

- without heating at some stage in the last year through lack of money

- unable to afford to keep the home adequately warm

- unable to afford to buy presents for family or friends at least once a year

- unable to afford to replace any worn out furniture

- unable to afford to have family or friends for a drink or meal once a month

- unable to afford a morning, afternoon or evening out in the last fortnight for entertainment.

The indicator **of basic deprivation** was developed by the Economic and Social Research Institute using data from the *Survey on Income and Living Conditions*. See Maître B., Nolan B. and Whelan C. (2006) *Reconfiguring the Measurement of Deprivation and Consistent Poverty in Ireland*, Dublin: ESRI, for further information on the indicator.

Censoring the matrix: people who experience less than the 3+ QoL problems (the threshold) are regarded as not experiencing multidimensional QoL problems and the score on the individual component dimensions is set back to zero. Dimension scores above 0 then relate only to those who are above the threshold.

Consistent poverty: this is a measure of poverty used in the *National Action Plan for Social Inclusion 2007-2016* (*NAPinclusion*) that takes account of the household's living standards as well as the household size, composition and total income. A household is consistently poor if the household

income is below the at-risk-of-poverty threshold (see above) and the household members are deprived of **at least 2 out of the 11 items** on the basic deprivation list.

Correlation: a correlation between two variables refers to a statistical relationship of dependence between these two variables. This relationship of dependence can be measured by a correlation coefficient and there are many of them. There are many correlation coefficients and the most known is the Pearson correlation coefficient which measures the strength of the linear relationship between two variables.

Deprivation: see definition for basic deprivation above for measure of deprivation used in the *NAPinclusion*.

Economic vulnerability: a measure of the economic situation of a household based on whether it is at-risk-of-poverty, experiences enforced basic deprivation and has difficulty making ends meet.

Employment rate: the employment rate is the proportion of the working-age population that is employed. The International Labour Organisation (ILO) definition of employed persons are those aged 15 years and over who have worked for payment or profit in the reference week (usually the week preceding the survey) or who had a job from which they were temporarily absent for reasons such as holidays, maternity leave or sick leave.

Equivalence scales: a set of relativities between the needs of households of differing size and composition, used to adjust household income to take into account the greater needs of larger households. In Ireland the national scale attributes a weight of one to the first adult (aged 14+) and 0.66 to each subsequent adult and a weight of 0.33 to each child. International comparisons such as the one done by Eurostat uses the modified OECD scale which attributes a weight of one to the first adult (aged 14+) and 0.5 to each subsequent adult and a weight of 0.3 to each child.

Equivalised Income: This refers to household income from all sources adjusted for differences in household size and composition (number of adults and children). It is calculated by dividing total disposable (i.e. after tax) household income by the equivalence scale value. It can be interpreted as income per adult-equivalent.

EU-SILC: *European Union Statistics on Income and Living Conditions*; this is a voluntary household survey carried out annually in a number of EU Member States allowing comparable statistics on income and living conditions to be compiled. In Ireland, the Central Statistics Office (CSO) have been conducting the survey since 2003. The results are reported in the Survey on Income and Living Conditions (SILC). Any data as compiled by Eurostat and any reference to the questions or questionnaire in the household survey is here referred to as 'EU-SILC'.

European Socio-Economic Classification (ESeC): the ESeC is an occupationally based classification but has rules to provide coverage of the whole adult population. The information required to create ESeC is:
- occupation coded to the minor groups (i.e. 3-digit groups) of EU variant of the International Standard Classification of Occupations 1988 (ISCO88 (COM))

- details of employment status, i.e. whether an employer, self-employed or employee

- number of employees at the workplace

- whether a worker is a supervisor

- economic sector (agriculture or other industries).

Factor analysis: a statistical technique to see whether a number of variables of interest (such as deprivation items) are linearly related to a smaller number of unobservable factors (such as dimension of deprivation).

Financial strain: is a composite indicator based on five items: difficulty making ends meet, housing costs burdensome, going into debt to meet ordinary living expenses, arrears on mortgage/rent or utility bills, and inability to save.

Gini coefficient: is a measure of inequality that ranges between 0 and 100 per cent. It is the relationship between cumulative shares of the population arranged according to the level of income and the cumulative share of total income received by them. If there was perfect equality (i.e. each person receives the same income) the Gini coefficient would be 0 per cent. A Gini coefficient of 100 per cent indicates total inequality and the entire national income was in the hands of one person.

Household: a household is usually defined for statistical purposes as either a person living alone or a group of people (not necessarily related) living at the same address with common housekeeping arrangements – that is, sharing at least one meal a day or sharing a living room or sitting room.

Household equivalent (or equivalised) income: household income adjusted to take account of differences in household size and composition by means of equivalence scales.

Latent class analysis:. Latent Class Analysis is a statistical technique used to identify unmeasured groups of subjects that have distinctive profiles in relation to a range of observed variables.

Lone parent: a parent who has primary custody of a dependent child and is not living with the other parent.

Material deprivation (EU): this indicator is one of the European Commission's common indicators on social protection and social inclusion. It measures the proportion of the population lacking at least three out of the following nine items:

- arrears on mortgage or rent payments, utility bills, hire purchase instalments or other loan payments

- capacity to afford paying for one week's annual holiday away from home

- capacity to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day

- capacity to face unexpected financial expenses (set amount corresponding to the monthly national at-risk-of-poverty threshold of the previous year)

- household cannot afford a telephone (including mobile phone)

- household cannot afford a colour TV

- household cannot afford a washing machine

- household cannot afford a car

- ability of the household to pay for keeping its home adequately warm.

Mean: the average value (for example, the average income in a sample obtained via household survey).

Median: the value that divides a sample in half (e.g. the income level above and below which half the people in a sample fall).

Multidimensional Quality of Life (QoL): Someone with problems on 3 or more of the 11 indicators of Quality of Life is considered as having multiple QoL deficits. The 11 QoL dimensions in the 2013 SILC include: income poverty, deprivation, financial strain, poor health, mental distress, crowded accommodation, housing quality problems, neighbourhood problems, mistrust in institutions, lack of social support and lack of safety.

Pearson correlation coefficient: shows the strength of the relationship between two indicators and ranges from 0 (no relationship) to 1 (perfect relationship).

Poverty gap: the shortfall in incomes for those who fall below the at-risk-of-poverty threshold.

Poverty and Social Exclusion: these terms are defined broadly in the *National Action Plan for Social Inclusion 2007-2016 (NAPinclusion)* as follows:

> 'People are living in poverty if their income and resources (material, cultural and social) are so inadequate as to preclude them from having a standard of living which is regarded as acceptable by Irish society generally. As a result of inadequate income and resources people may be excluded and marginalised from participating in activities which are considered the norm for other people in society.'

The two concepts are very similar when used in Irish policymaking but poverty is sometimes used in the narrower context to refer to low income (or wealth). On the other hand, social exclusion is almost always used in the broader sense, to refer to the inability to participate in society because of a lack of resources that are normally available to the general population.

Quintile: One-fifth of a sample divided into five equal parts to show how income, for example, is spread throughout the population; each quintile represents where a person's or household's income is located, ranging from the bottom quintile (lowest fifth or 20 per cent) to the top quintile (highest fifth or 20 per cent).

Self-Organising Maps: SOMs are an artificial neural network algorithm developed by Kohonen (1982, 2001) to extract meaningful underlying patterns from complex high-dimensional dataset into a lower dimensional output.

Severe material deprivation: this EU indicator measures the proportion of the population lacking at least four of the nine items listed in the EU index of material deprivation (see definition above).

SILC: in Ireland, the Central Statistics Office (CSO) is responsible for carrying out the EU-SILC survey. They produce analysis in accordance with Irish national poverty targets, indicators and related issues. These results are reported in the Survey on Income and Living Conditions (SILC). Any data or analysis that is sourced specifically from the CSO is here referred to as 'SILC'.

Social welfare transfers: cash receipts paid from various social welfare schemes received by the individual or household.

Well-being: is "a positive physical, social and mental state. It requires that basic needs are met, that individuals have a sense of purpose, that they feel able to achieve important goals, to participate in society and to live lives they value and have reason to value. Well-being is enhanced by conditions that include financial and personal security, meaningful and rewarding work, supportive personal relationships, strong and inclusive communities, good health, a healthy and attractive environment, and values of democracy and social justice" (NESC, 2009, p. 3).