ISSN 1977-0375

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Methodologies and
Working papers

Measuring material deprivation in the EU

Indicators for the whole population and child-specific indicators

2012 edition

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Eurostat is the Statistical Office of the European Union (EU). Its mission is to be the leading provider of high quality statistics on Europe. To that end, it gathers and analyses data from the National Statistical Institutes (NSIs) across Europe and provides comparable and harmonised data for the EU to use in the definition, implementation and analysis of EU policies. Its statistical products and services are also of great value to Europe's business community, professional organisations, academics, librarians, NGOs, the media and citizens.

In the field of income, poverty, social exclusion and living conditions, the EU Statistics on Income and Living Conditions (EU-SILC) is the main source for statistical data at European level.

Over the last years, important progress has been achieved in EU-SILC as a result of the coordinated work of Eurostat and the NSIs.

In June 2010, the European Council adopted a social inclusion target as part of the Europe 2020 Strategy: to lift at least 20 million people in the EU from the risk of poverty and exclusion by 2020. To monitor progress towards this target, the 'Employment, Social Policy, Health and Consumer Affairs' (EPSCO) EU Council of Ministers agreed on an 'at risk of poverty or social exclusion' indicator. To reflect the multidimensional nature of poverty and social exclusion, this indicator consists of three sub-indicators: i) at-risk-of-poverty (i.e. low income); ii) severe material deprivation; and iii) living in very low work intensity households. The Council also decided that the mid-term review of the EU target in 2015 would include a review of its three sub-indicators. Additionally, it stated that the mid-term review of the EU target should step up work on improved measures of material deprivation (MD).

The concept of MD is based on the affordability of a selection of items (goods or services) that are considered to be necessary or desirable for people to have an 'acceptable' standard of living in the country where they live. The analysis distinguishes between households that cannot afford a certain item (those materially deprived), and those that do not possess this item for another reason, e.g., because they do not want it. In EU-SILC, nine items are currently used by the EU to measure MD([1]).Severely materially deprived households are defined as those deprived for at least four of these nine items.

In addition to the nine MD items which are collected annually, an ad hoc MD module was included in the 2009 wave of EU-SILC. An academic assessment of these MD data was carried out by the Second Network for the Analysis of EU-SILC (Net-SILC2) in order to help prepare the required revision of the MD variables by 2015. These analyses included a detailed assessment of the dimensional structure of the whole set of 50 MD items from the 2009 wave of EU-SILC as well as their suitability, validity, reliability and additivity. The aggregation of MD items was also analysed and robust MD indicators for the whole population and for children were proposed. The current working paper comprises the outcomes of this study. It was prepared by Anne-Catherine Guio, David Gordon and Eric Marlier.

These important results have been peer reviewed by the Eurostat Task-Force on Material Deprivation which has then agreed on a list of seven new MD variables for the whole population (to be used together with six of the current nine EU-SILC items to measure MD for the whole EU population). Agreement was also reached on a list of 13 MD variables for children (to be used together with five household MD items for measuring child MD). These results will constitute the main basis for the revision of the MD component of the 'at risk of poverty or social exclusion' indicator in 2015. In order to take an informed decision for the adoption of the new indicators, an analysis of their evolution over time is needed. For this, it is

([1]) Coping with unexpected expenses; one week of annual holidays away from home; avoiding arrears; a meal with meat, chicken, fish or vegetarian equivalent every second day; keeping the home adequately warm; a washing machine; a colour TV; a telephone; a personal car.

planned to include all the selected new MD variables in the 2014 EU-SILC, in an ad hoc module, and (at least) the seven household's and adult's items in 2013, on a voluntary basis.

It should be stressed, however, that this methodological paper does not in any way represent the views of Eurostat, the European Commission or the European Union. This is academic research which the authors have contributed in a strictly personal capacity and not as representatives of any Government or official body. Thus they have been free to express their own views and to take full responsibility both for the judgments made about past and current policy and for the recommendations for future policy.

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(http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/publications/methodologies_and_working_papers).

Eurostat databases are also available at this address, as are tables with the most frequently used and requested short- and long-term indicators.

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MEASURING MATERIAL DEPRIVATION IN THE EU

Indicators for the whole population and child-specific indicators

(Anne-Catherine GUIO, David GORDON and Eric MARLIER([2]))

Abstract: In June 2010, European Union (EU) Heads of State and Government adopted a social inclusion target as part of the new 'Europe 2020 Strategy': to lift at least 20 million people in the EU from the risk of poverty and exclusion by 2020. One of the three indicators used to monitor progress towards this target is the EU indicator of 'severe material deprivation (MD)'.

The main limitations of the current EU MD indicators are the small number (nine) and weak reliability of some of the core items they are based on. MD measures for children are also needed. This is why a thematic module on MD was included in the 2009 wave of EU Statistics on Income and Living Conditions survey (EU-SILC). The core MD items of EU-SILC and related indicators will be revised as part of the mid-term review of the Europe 2020 Strategy in 2015.

This paper is an assessment of the 2009 EU-SILC MD data by researchers participating in the Second Network for the analysis of EU-SILC (Net-SILC2). It proposes an analytical framework for developing robust EU MD indicators for the whole population as well as for children.

([2]) David Gordon is from the School for Policy Studies at the University of Bristol (United Kingdom). Anne-Catherine Guio and Eric Marlier are from the CEPS/INSTEAD Research Institute (Luxembourg). We would like to thank Eldin Fahmy, Viliami Fifita, Shailen Nandy and Marco Pomati (University of Bristol) who, through providing us with in-depth data analyses, contributed significantly to this paper. Our thanks go also to Tony Atkinson, Jonathan Bradshaw, Alessio Fusco, Björn Halleröd, Petra Lehmann, Bertrand Maître, Brian Nolan, Brian Perry, Dorothy Watson and Chris Whelan as well as to the members of the EU Task-Force on 'Material Deprivation' and the members of the Indicators Sub-Group of the EU Social protection Committee for very helpful comments on earlier versions of this document (the EU Social Protection Committee [SPC] is comprised of high-level officials from the relevant ministries in each Member State and reports to the EU Ministers in charge of social policy). These persons should not, however, be held responsible in any way for the present contents. Our thanks go also to Isabelle Bouvy and Valya Momchilova for wonderful secretarial support. Finally, we wish to thank both the European Commission (Grant 10602.2010.004-2011.146; 'Second Network for the analysis of EU-SILC (Net-SILC2)') and the UK Economic and Social Research Council (Grant RES-060-25-0052; 'Poverty and Social Exclusion in the United Kingdom') for financial support.

1. Setting the scene

In 2009, material deprivation (MD) indicators were adopted by all 27 European Union (EU) Member States and the European Commission (Guio, 2009). They are now widely used by EU countries and the Commission to monitor progress in the fight against poverty and social exclusion at national and EU levels in the context of the EU cooperation in the social field.

Based on the limited information available from the EU Statistics on Income and Living Conditions (EU-SILC) data-set,([3]) the EU MD rate is currently defined as the proportion of people living in households who cannot afford at least 3 of the following 9 items:

- coping with unexpected expenses;
- one week annual holiday away from home;
- avoiding arrears (in mortgage or rent, utility bills or hire purchase instalments);
- a meal with meat, chicken, fish or vegetarian equivalent every second day;
- keeping the home adequately warm;
- a washing machine;
- a colour TV;
- a telephone;
- a personal car.

Since June 2010, the importance of MD indicators has grown significantly. The 'Lisbon Strategy', launched by EU Heads of State and Government in March 2000 as a framework for EU socio-economic policy coordination was replaced by the new 'Europe 2020 Strategy' on smart, sustainable and inclusive growth with five 'headline targets' to be achieved by 2020 (European Council (2010); for a thorough discussion of the social challenges linked to the new Europe 2020 Strategy, see the various contributions included in Marlier, Natali and Van Dam (2010)). The latter include a social inclusion target for the EU as a whole: 'promoting social inclusion, in particular through the reduction of poverty, by aiming to lift at least 20 million people out of the risk of poverty and social exclusion in the EU'.

The number of persons who are at-risk-of-poverty and social exclusion is defined according to three indicators:

1. the standard EU 'at-risk-of-poverty' indicator (people 'at risk of poverty' are people living in a household whose total equivalised income is below 60 % of the median national equivalised household income (the equivalence scale is the so-called OECD modified scale));([4])
2. an indicator of 'severe material deprivation' (a variation on the EU MD indicator presented above, in which the threshold has been raised from three to four out of the same nine items); and
3. a measure of 'very low household work intensity' (people in very low household work intensity are those aged 0-59 living in households where, on average, adult members

([3]) For detailed information on EU-SILC, see the Eurostat web-site: http://epp.eurostat.ec.europa.eu/portal/page/portal/microdata/eu_silc. See also Chapter 2 of Atkinson and Marlier (2010).

([4]) In this paper, when we use the expression 'poverty risk' or people 'at-risk-of-poverty' (in short 'AROP'), we always refer to this EU definition of income poverty. In some places, we use the expression 'subjective poverty', which is a different concept that refers to the household stating that it has 'great difficulties' or 'difficulties' with making ends meet.

aged 18-59 have worked less than 20 % of their total work potential during the income reference period (i.e. year prior to the survey)).([5])

The main limitations of the MD indicators currently used at EU level are the small number of items on which they rely and the weak reliability of some of these items. A small number of items means that there is a risk of unreliable measurement of MD in some EU Member States. This is a primary reason why a thematic module on MD was included in the 2009 wave of EU-SILC. A second important reason is the need to respond to the willingness of EU countries and the European Commission to complement the current set of EU social protection and social inclusion indicators with additional measures reflecting the situation of children([6]) Thus, the 2009 MD module includes specific children's items (see below). In the light of the analysis of the information collected through this module, the MD items currently included in the core part of EU-SILC will be reviewed and expanded ('core part' items are items collected each year as opposed to 'module' items that are collected less frequently, e.g. every 4-5 years, in the context of thematic modules). In 2015, a mid-term review of the Europe 2020 Strategy is planned. In line with the decision of EU Ministers in charge of Employment, Social Policy, Health and Consumer Affairs, this should include a review of the EU headline target on social inclusion as well as a review of the indicators this target is based on; this review is expected to allow 'taking into account economic developments and improved measurement instruments' (Council of the European Union, 2010).

This paper is an *independent contribution* to the assessment of the 2009 module which benefited from an EU research grant.([7]) Its objective is to propose an analytical framework for developing robust aggregate indicators that can be used for social monitoring purposes at national and EU levels and, as a result of the application of this framework, to propose EU MD indicators for the whole population and for children specifically.

([5]) See Eurostat web-site for exact definitions and national figures for each indicator and the target as a whole: http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators.

([6]) For the current list of EU social protection and social inclusion indicators, see European Commission (2009). For the national and EU average values of these indicators, see: http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/introduction.
Specifically on the need to promote a children mainstreaming approach, in the sense of 'viewing social inclusion from a child's perspective', which 'implies integrating a concern with the well-being and social inclusion of children into all areas of policy making' (and thus also in the indicators for monitoring these), see Marlier *et al* (2007).

([7]) This research was carried out in the context of the 'Second Network for the analysis of EU-SILC (Net-SILC2). Funded by Eurostat, the EU Statistical Office, Net-SILC2 brings together expertise from 16 European partners: the Luxembourg-based CEPS/INSTEAD Research Institute (Net-SILC2 coordinator), six National Statistical Institutes (from Austria, Finland, France, Luxembourg, Norway and the UK), the Bank of Italy and academics from 8 research bodies (in Belgium, Germany, Sweden and the UK). The aims of Net-SILC2 are: to carry out in-depth methodological work and socio-economic analysis based on EU-SILC data and covering both cross-sectional and longitudinal dimensions; to develop common tools and approaches regarding various aspects of data production; and to manage the overall scientific organisation of the 2012 and 2014 EU-SILC international conferences. Net-SILC2 (June 2011-May 2015) is the successor of Net-SILC1 (December 2008-December 2010). Readers interested can download the book on 'Income and living conditions in Europe' that was prepared by Net-SILC1 (Atkinson and Marlier, 2010).

2. Conceptual and analytical framework

2.1. Conceptual framework

Back in 1975, the EU Council of Ministers agreed that the poor are 'the persons whose resources are so small as to exclude them from the minimum acceptable way of life in the Member State in which they live', with 'resources' being defined as 'goods, cash income plus services from public and private sources' (Council of the European Union, 1975). This definition includes both outcome elements ('the exclusion from the minimum acceptable way of life') and input elements ('...due to a lack of resources'). In 1985, the Council amended this definition and enlarged the concept of 'resources' in order to take into account material, cultural and social aspects: 'the persons whose resources (material, cultural and social) are so limited as to exclude them from the minimum acceptable way of life in the Member State to which they belong' (Council of the European Union, 1985).

This definition was largely inspired by the work of Peter Townsend in the 1960s and succinctly described in 1979: '*Poverty can be defined objectively and applied consistently only in terms of the concept of relative deprivation. […] Individuals, families and groups in the population can be said to be in poverty when they lack the resources to obtain the type of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the societies to which they belong. Their resources are so seriously below those commanded by the average individual or family that they are, in effect, excluded from ordinary living patterns, customs or activities.*' (Townsend, 1979, p. 31) The Townsend approach is built on the importance of participation in the society to which the person belongs, i.e. relative deprivation occurs when people *'cannot obtain, at all or sufficiently, the conditions of life – that is, the diets, amenities, standards and services – which allow them to play the roles, participate in the relationships and follow the customary behaviour which is expected of them by virtue of their membership of society'* (Townsend, 1987, 1993). Thus, in Peter Townsend's theory of relative deprivation, poverty can be defined as a lack of sufficient resources and 'deprivation' is an outcome of poverty.

With a view to addressing the main limitations of the current EU MD indicators (small number of items and weak robustness of some of these), we have opted for a broad approach to the concept that makes full use of the richness of the 2009 EU-SILC survey (core survey and thematic module on MD). So, the analytical framework we present in Section 2.2 includes indicators related to: the basic amenities available in the dwelling, the dwelling's local environment, other elements related to housing conditions, the accessibility of bank/postal services and public transport, financial stress as well as various other enforced lacks (including in terms of social participation). (See Section 3 for the full list of items considered in our analysis). As will be clear from the analysis, this approach, which is both theory and data driven, leads to MD indicators covering some *key aspects of living conditions* which appear to be customary *across the whole* EU and from which some people are excluded *due to a lack of resources*. That is, a concept of MD that is consistent with Townsend's theory of relative deprivation and with the definition adopted by the EU Council of Ministers in 1985.

These MD indicators include some items that measure 'social deprivation' (Townsend, 1987) - leisure, celebrations, books, contacts with friends/family, holidays - which are customary in all Member States and form part of a common underlying latent concept of deprivation. These aggregated indicators do not aim to cover all aspects of poverty and social exclusion (e.g., health, employment, education, etc.). It is important to stress that when we consider lacks, we consider solely '*enforced* lacks', i.e. lacks due to insufficient resources and thus problems of affordability, rather than lacks resulting from choices or lifestyle preferences (Mack and Lansley, 1985). It is also important to highlight that 'the essential interest here is not so much in

the individual items per se as in the underlying situation of more generalised deprivation that they can help to capture' (Marlier *et al*, 2007, p. 177)([8]).

2.2. Analytical framework

Many authors have proposed theoretical or empirical criteria which can help identify relevant items to be included in a MD indicator (see, among others, Dickes (1989), Eurostat (2002), Guio (2009), Perry (2002), Whelan (1993)). The common analytical framework used in this paper draws extensively on the 1999 Poverty and Social Exclusion Survey deprivation indicator construction methodology (Gordon *et al* (2000); Pantazis *et al* (2006)).

The following aspects have been considered:

1. We have analysed the *dimensional structure* of the full set of items (i.e. items included in the core part of EU-SILC and items included in the EU-SILC MD module), by using different methodologies to explore the underlying structure to the data and by looking separately at the whole population (0+) and at children (1-15). This analysis is not used as a selection criterion of items per se. However, it is useful at an exploratory stage as it provides a better understanding of the interrelations between items. These analyses are presented in Section 4.
2. We have then ensured *a robust selection* of items, by considering four aspects to select the final optimal lists of MD items (one list for the indicator related to the total population [0+] and one list for the child indicator):
   a) The *suitability* of the items, in order to check that citizens in the different Member States (as well as the different population sub-groups within each Member State) consider them necessary for people to have an 'acceptable' standard of living in the country where they live. Here, 'suitability' is therefore to be understood as 'appropriateness to reflect low standard of living'. This is analysed in Section 5.
   b) The *validity* of individual items, to ensure that each item exhibits statistically significant relative risk ratios with independent variables known to be correlated with MD (Section 6)([9]).
   c) The *reliability* of the MD scale, to assess the internal consistency of the scale as a whole - i.e., how closely related the set of MD items are as a group. This analysis is based on the Cronbach's alpha and a *Classical Test Theory (CTT)* framework (Section 7). Section 8 summarises the results of the suitability, validity and reliability (CTT) analyses which were carried out on all available MD items, for the 0+ and child populations, separately for each of the 27 EU Member States. This reliability analysis is complemented in Section 9 with additional tests on the reliability of each individual item in the scale using *Item Response Theory (IRT)*.
   d) The *additivity* of items, to test that, say, someone with a MD indicator score of '2' is in reality suffering from more severe MD than someone with a score of '1', i.e. that the MD indicator's components add up. This is analysed in Section 11 for the items that have successfully passed the suitability, validity and reliability (CCT plus IRT) tests (see Section 10 for summary tables of all these tests). The additivity analysis was also carried out (for the 0+ and child populations) for the EU as a whole as well as separately for each of the 27 EU countries.

([8]) 'A useful analogy may be the way a battery of different survey responses can be used to categorise respondents by, say, personality type: any one response item may not be a reliable indicator, but taken together a set of responses can provide a very much more reliable basis for categorisation.' (Marlier *et al*, 2007, p. 194)

([9]) The validity of the deprivation scales as a whole is examined in Section 13.

For each of these four aspects, selection criteria were drawn from the literature.

The items that have successfully passed these 4 steps and are thus suitable, valid, reliable and additive, were then *candidates for being aggregated* into a MD deprivation indicator for: i) the whole population (0+); and ii) children (between 1 and 15). This is discussed in Sections 12-13.

3. Finally, we have tested the list of selected items (and related aggregate indicators) against the methodological principles imposed by the EU framework for the development of EU social protection and social inclusion indicators. Indeed, for indicators to be fit for purpose, i.e. in this case, to ensure that they will provide robust tools for assessing and monitoring MD not only at EU level but also at individual Member State's level, their construction needs to follow a *principle-based* approach. One of these methodological principles is the need to ensure 'a sufficient level of cross countries comparability'. The strict criteria we have used in our suitability, validity, reliability and additivity analyses aim at addressing this essential requirement (see Section 12).

2.3. Child deprivation: the need for a holistic and life-cycle approach

In our suggested MD child indicator, we have opted to complement the children's items with most of the (suitable, valid, reliable and additive) MD items collected at household level, contrary to some other recent analyses of the 2009 EU-SILC MD module (see Gábos *et al* (2011), de Neubourg *et al* (2012), Watson *et al* (2012), Whelan (2012)). Our choice is motivated by the fact that we believe (in line with scientific evidence, see below) that in order to adequately measure children's MD it is necessary to look not only at MD that solely affects children, but also at the MD that affects the households in which they live and that is likely to impact on their living conditions. In our view, the whole set of items affecting children's living conditions should therefore be included in a child MD indicator (Gordon *et al*, 2003), regardless of the statistical unit it refers to (which, in many cases, primarily reflects a choice made on the basis of data collection rather than conceptual considerations).

As highlighted by Atkinson *et al* (2002) and Atkinson and Marlier (2010, 2011), close links are required between the design of social indicators and the questions they are intended to answer. If the aim of a child MD indicator is to measure intra-household transfers or within-household differences in living standards, then all household level items would need to be removed from the MD indicator. By contrast, if the aim of a child MD indicator is to measure and compare the living standards of children in different households (as we want to do here), then the relevant household level MD items that have a direct effect on children's living conditions need to be included in the child MD indicator. This is particularly true where there is scientific evidence that these deprivations have worse or different effects on children than on adults (Marsh *et al*, 1999, 2000).

The inclusion of household items in a child indicator has to be interpreted from a holistic and life-cycle point of view: we do not only consider items directly impacting on immediate children's standard well-being (inadequate warmth in home, lack of durables etc.) but also items which may have an indirect or future impact on their well-being. For example, the inability to face unexpected expenses may have an impact on children's living conditions in a very near future (in the case of an accident, an illness, an inability to replace a car in a remote area, etc.). Problems of arrears may impact not only on the household's adult members but also on the children, for example through the financial stress they will feel and the consequences of it in the short and longer term. Qualitative studies have also shown that children in households suffering from financial strain often do not ask their parents for the things they need which cost money in order to try to protect their parents from stress and feelings of guilt (Ridge, 2002 & 2011, Observatoire de l'Enfance, de la Jeunesse et de l'Aide à la jeunesse & Sonecom, 2010).

3. Dataset

3.1. EU-SILC thematic module and core part

The full set of MD information available from the 2009 wave of EU-SILC was analysed, i.e. the items collected in the thematic MD module *and* in the core part. In total, this was 50 items, with 17 of them focusing specifically on the situation of children. The full set of items is as follows (M=module items):

A. 'Adult items', i.e. items collected at individual adult level (population: all 'adults' [i.e. people aged 16+] living in private households)

The person cannot afford (but would like to have, i.e. a lack is an 'enforced lack' and does not simply reflect a choice):([10])

1. A mobile phone (Module [M])
2. To replace worn-out clothes by some new (not second-hand) ones (M)
3. Two pairs of properly fitting shoes, including a pair of all-weather shoes (M)
4. To spend a small amount of money each week on oneself without having to consult anyone (hereafter referred to as 'pocket money') (M)
5. To get together with friends/family for a drink/meal at least monthly (M)
6. To have regular leisure activities (M)

B. 'Household items', i.e. items collected at household level (population: whole population living in private households)

The household's dwelling suffers from:

7. Absence of hot running water (M)
8. Shortage of space in the dwelling (M)
9. Darkness, not enough day-light
10. Leaky roof, damp walls/floors/foundations or rot in window frames or floor
11. Absence of indoor flushing toilet for sole use of the household
12. Absence of bath or shower in the dwelling

The local environment of the household's dwelling suffers from:

13. Litter lying around in the neighbourhood (M)
14. Damaged public amenities (M)
15. Noise from neighbours or from the street
16. Pollution, grime or other environmental problems
17. Crime, violence or vandalism in the area

The household is confronted with:

18. Overcrowding([11])
19. High housing costs (>40 % total equivalised household disposable income)([12])

([10]) These 50 'items' include three constructed indicators ('Arrears', 'Overcrowding' and 'High housing costs') which draw on several EU-SILC variables. However, for ease of reference, we also refer to these as 'items'.

([11]) The definition of 'overcrowding' is the commonly agreed EU definition (see European Commission, 2009). It captures space problems on the basis on the number of persons in the households, by taking into account the age/gender of children.

([12]) The definition of 'high housing costs' is the agreed EU definition (see European Commission, 2009).

The household cannot afford:

20. To replace worn-out furniture (but would like to have) (M)
21. A meal with meat, chicken, fish or vegetarian equivalent every second day
22. To face unexpected expenses ([13])
23. To keep home adequately warm
24. One week annual holiday away from home
25. To avoid arrears (mortgage or rent, utility bills or hire purchase instalments)
26. A washing machine (but would like to have)
27. A colour TV (but would like to have)
28. A telephone, including mobile phone (but would like to have)
29. A computer (but would like to have)
30. A car/van for private use (but would like to have)
31. An Internet connection (but would like to have) (M)

The household has a (very) difficult access to:

32. Public transport (M)
33. Postal/banking services (M)

C. 'Children's items', i.e. items specifically focused on children (these items are collected at household level)

The household cannot afford *for at least one child (enforced lack)*:

1. Some new (not second-hand) clothes (M)
2. Two pairs of properly fitting shoes, including a pair of all-weather shoes (M)
3. Fresh fruits & vegetables daily (M)
4. Three meals a day (M)
5. One meal with meat, chicken, fish or vegetarian equivalent daily (M)
6. Books at home suitable for the children's age (M)
7. Outdoor leisure equipment (M)
8. Indoor games (M)
9. A suitable place to do homework (M)
10. To consult a dentist when needed (M - 'optional', i.e. countries were allowed not to collect this item)
11. To consult a general practitioner (GP) when needed (M - optional)
12. Regular leisure activities (sports, youth organisations, etc.) (M)
13. Celebrations on special occasions (M)
14. To invite friends round to play and eat from time to time (M)
15. To participate in school trips and school events that costs money (M)
16. Outdoor space in the neighbourhood to play safely (M)
17. One week annual holiday away from home (M - optional)

([13]) The amount referred to in the survey protocol corresponds to the monthly national poverty threshold. The protocol mentions that this amount is to be paid by the household using only its own resources.

3.2. Adult items

The adult items were gathered at individual level for people aged 16 or over. Apart from providing rich information about actual adults' living conditions, these items offer, for the first time, the possibility to partly open up the 'black box' of the household unit and to question the 'intra-household sharing of resources' hypothesis (Daly (1989); Glendinning and Millar (1992)).

In order to include adult items into a MD indicator defined for the whole population, the MD adult information was assigned to all household members, by using all the available adult information in the household. Adults and children are considered deprived if at least half the adults (for which the information is available) are deprived. The same rule applies in all 'Register countries([14])', where adult information was only collected for one adult, the selected respondent (i.e., the information provided by the selected respondent was allocated to all other household members).

3.3. Children's items

Data relating to the living conditions of children are not collected from the children themselves but from the adult answering the 'household questionnaire' (household respondent). According to the survey protocol to be followed by countries, if in a given household at least one child does not have an item, it is then assumed that all the children belonging to that household lack that item (see Eurostat, 2011). This assumption has been made for pragmatic reasons. Ideally, it would be preferable to know the deprivation levels of each child in a household separately; it would then be possible to study differences in child deprivation within each household as well as between each household (e.g. if girls suffer more deprivation than boys, or teenagers more than younger children living in the same household).

For most children's items, the information was gathered for children aged between 1 and 15 (i.e. children's items were collected in households with at least one child in this age bracket). Therefore, our suggested child-specific MD indicator covers only children aged between 1 and 15. For consistency reasons, we had to exclude all children aged less than one from our calculations related to the child-specific indicator, even though information was available for some of them (where they have brothers/sisters aged between 1 and 15). Due to inconsistencies with the way some countries coded the children's MD data, we have also chosen to drop from our calculations all children aged one or two who were flagged as 'not applicable' (because their households were erroneously considered as not having any children aged between 1 and 15). It is important to highlight here that there is no available information in the 2009 module that allows the measurement of early childhood material deprivation, which is a weakness of the module that should be addressed in the future. It is also important to highlight that, as a result of the way data were collected in the 2009 EU-SILC module on MD, 'children' here do not refer to the same population as the one covered by the existing commonly agreed EU social protection and social inclusion indicators: 1-15 as opposed to 0-17 (in EU-SILC, teenagers aged 16 and 17 are interviewed individually on the basis of the adult questionnaire).

Two children's MD items were collected only in households with at least one child attending school (school trips and place to do homework) and are therefore less relevant for younger children. We have considered that children living in households where no child is attending school, by definition, do not lack these 2 items. In a household with both preschool age children and children attending school, all the children of the household are considered deprived if those attending school lack the item (in this case, the household information concerning only the older children is assumed to predict the future living conditions of the preschool age children of the household).

([14]) Register countries are countries which collect a significant amount of the EU-SILC information (esp. income information) not through surveys but through administrative registers. For more information, see Chapter 2 of Atkinson and Marlier (2010).

3.4. Missing pattern

In Annex 1, we analyse the pattern of missing values by country. (For an analysis of the 2009 MD module data collection, including a short analysis of the missing values, see also Eurostat (2011).)

It is important to note that, in Sweden, the 2009 MD module items were not submitted to the newly drawn panel([15]), which means that about 25 % of the total Swedish sample did not answer these questions. Additional missing values not randomly distributed were also detected (see Annex 1). Results for Sweden must therefore be interpreted with caution (because of possible representativeness problems) and are only provided for illustration.

3.5. Redundancy

To avoid having redundant information in the proposed indicators, we have combined some items that were closely related (highly correlated).

3.5.1. Internet and computer

The very high correlation between the enforced lack of a computer and the lack of Internet access shows that these two items are redundant (tetrachoric correlation of 0.95 on the EU pooled data). Internet access is an important dimension of social inclusion. However, there are quite high proportions of people in certain countries who have access to the Internet but not to a computer (see Table A3 in Annex 2). We have serious doubts about the way the issue of Internet access was interpreted during the data collection. For example: have interviewers/ interviewees considered that they had access to Internet even if this access is outside their home (work, Internet café...) or via mobile telephony, or only if access is available in their dwelling? Furthermore, Internet connection was 'not wanted' by a non-negligible proportion of the population (see below in Section 5.1). So, with a view to increasing the robustness of the measure, we consider here that a household is deprived only if it lacks both a computer AND Internet access. The EU-SILC variable related to Internet access would need to be revised for future data collection in order to encompass all different means available to access the Internet.

3.5.2. Hot running water, flushing toilet and bath/shower

The very high correlation between these three items shows that they are redundant (correlation of 0.98 between toilet and bath/shower, and 0.94 and 0.96 between hot running water and the other two items, on the EU pooled data). We have therefore combined these 3 items into a single one and we consider a household as deprived if it lacks at least one of these 3 items.

3.5.3. Shortage of space, overcrowding

Two items in EU-SILC capture the lack of space. The first one is subjective (shortage of space in the dwelling: yes/no). The second is objective and based on the number of persons/rooms, depending on the age and sex of the household members. However, these two items are not highly correlated: 0.54, so we have kept both items in our analysis in order to adequately capture this difficult dimension of MD.

([15]) EU-SILC is a rotating panel. One fourth of the sample is renewed each year. For more information, see Chapter 2 of Atkinson and Marlier (2010).

4. Dimensional structure of the full set of MD items (module and core part)

4.1. Dimensional structure - Whole population

In order to explore the dimensional structure of the full set of MD items available from the 2009 wave of EU-SILC (i.e. those included in the core part of EU-SILC and those covered in the thematic MD module), we used three different statistical methods (factor analysis, multiple correspondence analysis and cluster analysis) on the whole population (0+) sample. So, we compared the results obtained by three types of dimensional analysis: one based on correlations (factor analysis), one based on entropy (multiple correspondence analysis) and one based on Euclidian distances (cluster analysis)([16]).

Factor analysis (FA) is one technique that can be used to group a wide range of variables into a smaller number of dimensions. This technique is sometimes criticised (see, for example, McKay and Collard, 2003) because of the degree of arbitrariness in the choice of items and in the number of factors. Furthermore, as the technique is data driven, different solutions can be obtained from different samples or from the same sample over time. However, it remains a useful tool for exploring the underlying structure of data. (For an example of the use of FA in MD research, see Guio, 2009.([17]))

A FA is usually based on Pearson correlations of continuous variables. However, problems may occur when the variables are discrete and dichotomous, this can lead to categorisation errors (see Dekkers, 2008). Tetrachoric correlations are better suited to the binary nature of MD data. We have followed Dekkers (2008) and used the matrix of tetrachoric correlations as the input for the FA (see also discussion in Nunally and Bernstein, 1994, pp. 570-573).

We ran an exploratory FA on the pooled (EU) dataset. The scree plot (see Figure A1 in Annex 3) illustrates the proportion of the variance that may be attributed to each factor. A standard rule is to limit the number of factors when the curve makes an elbow towards a less steep decline (Cattell's scree test). We have retained a four-factor solution (the factor loadings are provided in Table A4 in Annex 3; see also Table A6):

1. The first factor includes all adult MD items, i.e. most of the MD items used in the current indicator (unexpected expenses, holidays, meat/chicken etc., arrears, dwelling not warm, car), replacing household furniture, Internet/computer and, though only weakly, high housing costs. This first underlying factor explains most of the variation. As we will see, it is similar to the final list of items identified by our validity, reliability and additivity tests. This factor could thus be labelled ***'Material deprivation (MD)'.***
2. The second factor encompasses *basic durables, basic amenities and housing.*
3. The third factor consists of *local environment* problems.
4. The two items related to *accessibility problems* form a clearly separate dimension.

Oblique rotation was used based on the hypothesis that the dimensions may be correlated. Peter Townsend's theory of relative deprivation argues that poverty is a lack of command over sufficient resources over time and that one of the outcomes of poverty is deprivation (Townsend, 1954, 1962, 1979). This theory postulates that deprivation is likely to be multi-

([16]) We also examined the dimensionality of these data using the General Linear Model (GLM); the categorical nature of the variables did not conform to the requirements of Fisher's Discriminant Function Analysis. However, a Non-linear Canonical Correlation analysis was undertaken. These results are not presented in this paper.

([17]) For other examples of the use of confirmatory factor analysis in MD literature, see also Whelan *et al* (2001), Eurostat (2002), Jensen *et al* (2002), Dekkers (2008), Guio (2009).

dimensional consisting of two or more correlated dimensions (Townsend, 1987). Our CFA results show that different dimensions of MD tend to be positively correlated, as is reflected by the covariance between the dimensions (Table 1) - i.e., being deprived in one dimension is positively correlated with deprivation in other dimensions.

The first two factors are the most strongly correlated. Local environment and accessibility are very weakly correlated with the other dimensions, which confirms that these items measure very distinct aspects of living conditions.

Table 1: Inter-factor correlations, whole population, 2009

	Factor 1 Material Deprivation	Factor 2 Basic amenities	Factor 3 Local environment	Factor 4 Accessibility
Factor 1	1.00	0.51	0.12	0.21
Factor 2	0.51	1.00	0.09	0.16
Factor 3	0.12	0.09	1.00	-0.05
Factor 4	0.21	0.16	-0.05	1.00

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

In order to compare these results with those obtained through other methods, we also used multiple correspondence analysis (MCA). Conceptually, it is similar to principal component analysis but it applies to categorical rather than continuous data. This is traditionally applied to contingency tables and decomposes the chi-square statistic associated with this table into orthogonal factors. We have retained a four-factor solution for our analysis. Over 19 % of the total chi-square and inertia([18]) is explained by the first dimension (7 % by the second dimension, 5 % by the remaining ones). Results are comparable to those of the FA, except that the housing dimension is clustered with the MD dimension (see Dimension 1 in Table A5 in Annex 3). This is not in contradiction with the results provided by the FA analysis, as the housing items in the MCA analysis load very weakly on the first dimension and also load positively on the third dimension (basic amenities; Dimension 3 in Table A5 in Annex 3).

Finally, we used cluster analysis to examining the multidimensional grouping of variables. A proximity matrix was calculated using a binary measure of squared Euclidean Distance (i.e. the straight line distance between each variable in multidimensional space). Clusters were initially produced using Ward's Method (Increasing Sum of Squares), which is a hierarchical technique and the optimum number of clusters was determined using Mojena's Upper Tail Rule and Wishart's Bootstrap validation method (Mojena, 1977; Mojena and Wishart, 1980; Milligan and Cooper, 1985; Wishart, 2005). In order to ensure that all variables had been grouped into the correct clusters, a K-Means analysis was then run using the clusters produced by the Ward's method analysis as the initial starting seed points (Everitt, Landau and Leese, 2001). The results are shown as a Dendrogram in Figure A2 in Annex 3. To help interpret these cluster results, non-metric multidimensional scaling (MDS) is also used to map the cluster solution onto a two dimensional scatter plot (Figure A3 in Annex 3). (See also Figure A4 in Annex 3 for the bootstrap validation of the number of clusters.)

([18]) The concept of inertia in correspondence analysis is analogous to the concept of variance in factor analysis, and it is proportional to the chi-square information.

Five clusters of variables are identified:

1) **Cluster 1** (Red on the MDS plot, Figure A3) is mainly comprised of consumer durables, household possessions and housing conditions (TV is the exemplar for this cluster). Three housing condition variables (Space, Damp and Overcrowding) in this main cluster are slightly detached. Apart from these last three variables, Cluster 1 is a fairly tight cluster with all the variables relatively close to each other in multidimensional space.
2) **Cluster 2** (Blue on the MDS plot) is made up of four of the adult deprivations (clothes, some money to spend on oneself, friends and family to visit for a drink/meal, and leisure activities). This four variable cluster mainly measures social elements of deprivation (Having a drink/meal with friends is the exemplar for this cluster) and lies close to the main cluster (Cluster 1).
3) **Cluster 3** (Dark Green on the MDS plot) consists of the neighbourhood/ environment deprivation variables (Vandalism is the exemplar for this cluster).
4) **Cluster 4** (Pink on the MDS plot) is composed of the two items related to deprivation in terms of access to services (Difficulty with public transport and Difficulty with post/bank).
5) **Cluster 5** (Light green on the MDS plot) has three members (Holiday, Furniture and Being able to pay unexpected expenses), these three variables are those which households go without when they first become poor i.e. they are often the first things a household cuts back on when their income falls below the poverty threshold (Holiday is the exemplar for this cluster). In the MCA, these three items had the smallest impact on the total inertia in Dimension 1.

If we now focus on the *common findings* between the three dimensional analysis methodologies, we see that:

- the local environment constitutes a separate dimension/cluster;
- the two items related to accessibility problems also form a distinct dimension/cluster;
- basic amenities and lack of basic durables (TV, telephone and washing machine) are grouped together.

As to the housing items:

- in the FA, they are regrouped with basic amenities in a dimension closely related to material deprivation;
- in the MCA, they are included in the MD dimension (which is orthogonal to the other dimensions) and also in the dimension related to basic amenities;
- in the cluster analysis, they are grouped with the main MD cluster, but in the case of High housing costs, Space, Damp and Overcrowding they form a slightly detached part of this cluster.

As we will see in the next sections, the housing items are 'borderline' in many of our tests and are thus not retained for inclusion into our proposed MD indicators.

4.2. Dimensional structure - Child population

In order to explore the underlying structure on all the EU-SILC MD information relevant for the specific situation of children we ran Factor, Multiple Correspondence and Cluster analyses on the sub-sample of persons aged 1-15.

In the FA, we have retained a six-factor solution (the factor loadings are provided in Table A7 in Annex 3):

1. the first factor includes all children MD items (except Outdoor space to play safely), as well as household items like Inadequate warmth, Furniture, Overcrowding and durables;
2. the second factor is made up of the local environment deprivation variables and Outdoor space to play;
3. the third factor encompasses the housing items;
4. the fourth factor is composed of the two child Unmet medical items and Outdoor space to play, although all other children deprivation items also load on this factor;
5. the fifth factor has three items (child Holiday, Arrears, ability to pay unexpected Expenses). ;
6. the two items related to accessibility issues form a clearly separate dimension, regrouped with High housing costs (Factor 6).

Factors 1 and 3, 1 and 4 and 1 and 5 are strongly correlated. Local environment (Factor 2) and accessibility (Factor 6) are very weakly correlated with the other dimensions.

In order to compare these results with those obtained through other methods, we also ran a MCA. We have retained a six-factor solution (see Table A8 in Annex 3). Over 22 % of the total chi-square and inertia is explained by the first dimension (6 % by the second dimension, 5 % by the third one and around 3 % by the remaining ones). According to the points' coordinates presented in Table A8, Dimension 1 contains all the child specific MD items except Outdoor space to play safely. This dimension also includes the enforced lack of a Car, Computer & Internet and other Basic durables, as well as the items related to Home not adequately warm, Overcrowding, Lack of furniture and the inability to pay Unexpected expense (dimension 1). It is, however, worth noting that child holidays, Overcrowding, Capacity to face unexpected expenses, Arrears and Furniture are not strongly associated with the first dimension (see Table A8). Dimension 2 encompasses the items related to local environment (Litter lying around, Damaged public amenities, Crime, Noise, Pollution), housing conditions items (Darkness, Leaking roof, Shortage of space) and the lack of Outdoor space for children to play safely (see dimension 2 in Table A8 in Annex 3). Dimensions 3, 5 and 6 have several variables in common, including the two items related to children unmet medical needs and children three meals, and the lack of Basic durables (TV, Telephone, Washing machine). Dimension 4 contains the two items related to Accessibility problems.

We then ran a cluster analysis whose results are shown as a Dendrogram (Figure A5 in Annex 3), and as a MDS two dimensional scatter plot (Figure A6 in Annex 3).

These results can be summarised as follows:

1) **Cluster 1** (Red on the MDS plot, Figure A6) contains all the child specific deprivation items except Outdoor space to play safely and Holidays. This cluster also contains a number of household variables (Basic amenities, PC/Internet, Telephone, TV, Washing machine, Inadequate Warmth, Car). The fine cluster structure shows that this main cluster could be further subdivided into a group of variables which mainly measure the material deprivation of children (Clothes, Shoes, Fruit, Meat, Three meals a day) and a group of variables which mainly measure social deprivations and play equipment

(Books, Outdoor equipment, Indoor games, School trips, Celebrations, activities with Friends, Leisure activities). Three variables (Dark accommodation, High housing costs, Arrears) in this main cluster are slightly detached. Apart from these last three variables, Cluster 1 is a fairly tight cluster with all the variables relatively close to each other in multidimensional space.

2) **Cluster 2** (Blue on the MDS plot) is made up of the local environment deprivation variables and Outdoor space to play safely; it is relatively spread out across multidimensional space.
3) **Cluster 3** (Dark Green on the MDS plot) has only two members (Shortage of Space and Overcrowding) and clearly measures space problems in the dwelling.
4) **Cluster 4** (Pink on the MDS plot) is composed of the two accesses to services deprivations (access problems for Post/Banks and Public transport)
5) **Cluster 5** (Light green on the MDS plot) has three members (Holiday, Furniture, ability to pay unexpected Expenses). These three variables are those which households go without when they first become poor, i.e. they are often the first things a household cuts back on when their income falls below the poverty threshold.

If we now focus on the *common findings* between the dimensionality methodologies for children's deprivation, we see that:

- most of the child specific items are grouped together. The two children's items related to unmet medical needs, Three meals a day and Holidays may be distinct, depending on the method used;
- the child specific items are grouped with household MD items into a large dimension, explaining most of the variance. However, Unexpected expenses, Arrears and Furniture are weakly correlated with this first dimension;
- the local environment constitutes a separate dimension/cluster and includes the Outdoor space to play safely item;
- the two items related to accessibility issues also form a distinct dimension/cluster.

5. Suitability of the full set of MD items

In Section 2.1 above, we referred to Peter Townsend's definition of poverty which raises the question of the difficult choice of MD items that 'are customary, or at least widely encouraged or approved, in the societies to which (individuals, families and groups in the population) belong'.

Mack and Lansley (1985) proposed an innovative consensual approach to identify 'necessities' in Britain, by taking into account the judgment of individuals as to what constitutes an acceptable standard of living. They defined necessities as possessions and activities that every family (or person) should be able to afford and that nobody should have to live without. An item regarded as necessary by at least 50 % of interviewees should be seen as a 'socially perceived necessity'.

In order to assess the relevance (in terms of 'socially perceived necessity'), in the different EU Member States, of the MD items available from EU-SILC, and also to identify which other MD items could be (also/ more) appropriate to reflect a minimum standard of living in the different countries, an EU wide Eurobarometer survey on the perception of poverty and social exclusion was carried out in 2007 (see TNS (2007) for a description of the survey; see Accardo and de Saint Pol (2009), Dickes *et al* (2010), Guio *et al* (2009) for an analysis of these data). This Eurobarometer was the first EU dataset that allowed a comparative analysis of the items that citizens in the different Member States consider to be necessary for people to have an 'acceptable' standard of living in the country where they live([19]).Annex 4 presents a 'heat map' of the 2007 Eurobarometer results for each country, which shows a high level of consistency within countries about which deprivation items are considered to be necessary by a high percentage of the population and which deprivation items are considered by only a minority of respondents to be a 'necessity of life'. However, it should be noted that these Eurobarometer survey data were collected before the financial crisis in 2008 and the consequent recession in Europe. It is possible that beliefs about what constitutes necessities of life have changed in some EU countries during the past five years.

There can also be differences between what people consider necessary for the whole of society compared to their own needs, so we examined the actual behaviour of people, using the 2009 EU-SILC data. As Perry (2002) suggested, we defined the degree of 'importance' of each item, at EU and country levels, as the proportion of people 'wanting' an item (which encompasses both people who have the item AND people who would like it but cannot afford it).

Only EU-SILC questions distinguishing between a 'simple' lack of item (people simply do not possess/ have access to the item) and an 'enforced' lack of item (people would like to possess/ have access to an item but cannot afford it) could be analysed in this way (i.e. durables in the core part of EU-SILC and the majority of items collected in the module). These items have three answer categories:

1) have the item;

2) do not have the item because cannot afford it;

3) do not have the item for any other reason.

([19]) For identifying socially perceived necessities throughout the EU, Eurobarometer interviewees were asked the following series of questions: 'In the following questions, we would like to understand better what, in your view, is necessary for people to have what can be considered as an acceptable or decent standard of living in [your country]. For a person to have a decent standard of living in [your country], please tell me how necessary do you think it is to…'. The potential answers were: 'absolutely necessary, no one should have to do without', 'necessary', 'desirable but not necessary' and 'not at all necessary'.

5.1. Suitability of the items in the EU as a whole and between countries within the EU

We performed our analysis on available (non-missing) raw data at the individual level. Figure 1 presents the proportion of people (not) 'wanting' an item (EU-27 average). If we put the suitability threshold at 70 %, all items pass the test except adult leisure activity. In fact, most items are wanted by a huge majority of the population: at least 90 %.

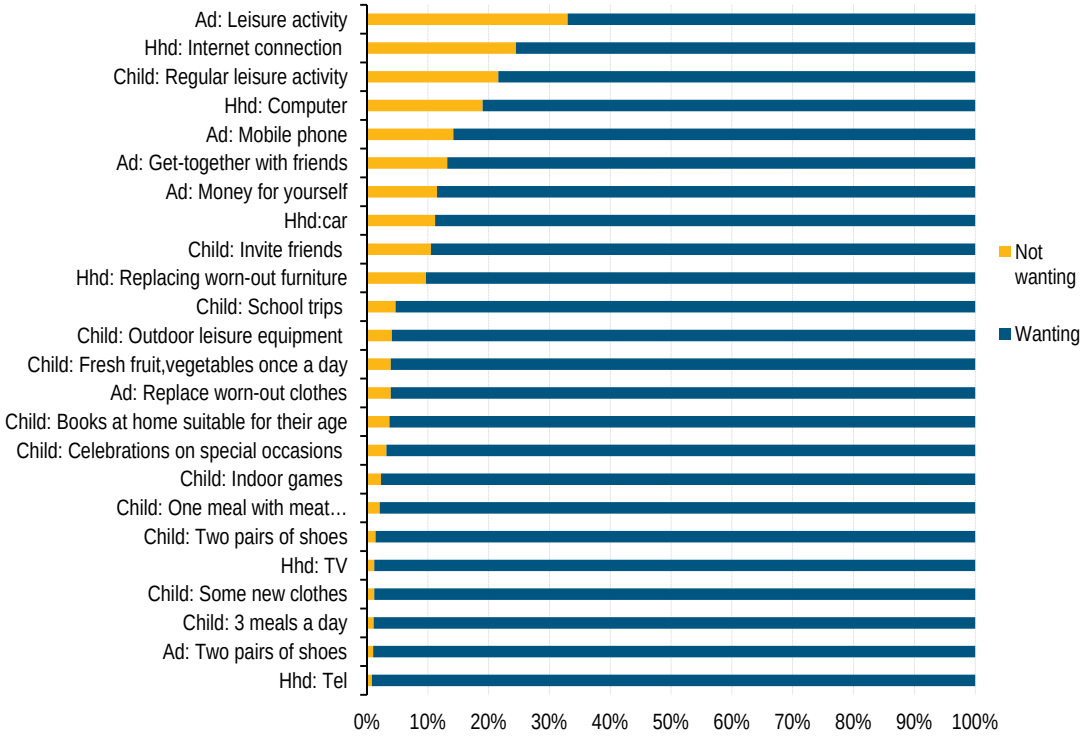
The failure for the item related to adult leisure activity to attain the 70 % threshold needs to be interpreted cautiously. Indeed, with 'consumer durables' and other material possessions, people usually either 'want' them or 'don't want them'; however, with social activities, the 'No, for any other reason' category is likely to include people who want to do this activity but are prevented from doing so by other constraints beyond a lack of income, e.g. lack of time due to caring responsibilities or due to work, poor health, no vehicle/ public transport, problem of physical access, feeling unwelcome, etc. (see Gordon *et al*, 2000; Pantazis *et al*, 2006). This can be particularly relevant for older people, a group for which it is especially important to be in a position to distinguish between tastes/choices and constraints (health etc.). We return to this issue in the next section.

For these reasons, following the 2012 '*Poverty and Social Exclusion Survey in the United Kingdom*' methodology, we would advise four rather than three answer categories for the EU-SILC *social participation deprivation* questions in the next EU-SILC data collection:

1) do;
2) do not do but do not want to do;
3) do not do and cannot afford;
4) do not do for any other reason.

Given these concerns, we decided that it would be wrong to reject the leisure item on the grounds that it does not reach the 70 % threshold (even more so because over two-thirds of respondents either do have or would like to have but cannot afford regular leisure activities).

Figure 1: People (not) 'wanting' the item, EU-27, 2009, (%)



Notes: People who 'want' the item are people who have the item plus people who would like it but cannot afford it. By contrast, people who 'do not want' the item are those who do not have it but for other reasons than financial stress. Ad: adults; Hhd: persons living in household.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

In order to test the homogeneity of preferences *between EU countries* (national preferences), we have compared the proportions of 'wanting' between countries for each item and plotted these proportions, with a 95 % confidence interval([20]).

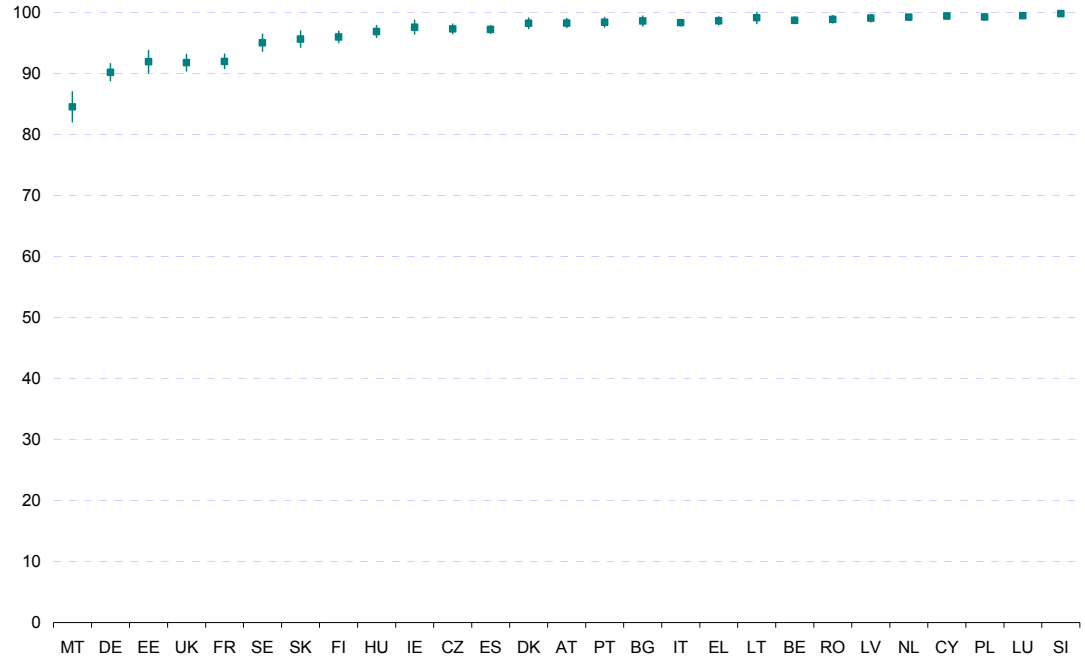
For children's MD items, the proportion of 'wanting' is very high and the variation between countries is very low. This is true not only for basic items (food, clothes and shoes) but also for other items such as the availability of games, celebration, books or outdoor equipment. Figure 2 illustrates the proportion of children living in households 'wanting' fresh fruits/vegetables for them at least once a day. In most countries, the desirability of the item is very high.([21]) In Malta, it is lower (85 %) than in the remaining countries. This Maltese exception holds true for other items related to children's food deprivation such as 'three meals a day' (80 %) or 'meal with proteins (i.e. chicken, meat or fish or vegetarian equivalent)' (87 %). This might be explained by different eating habits in Malta, such as the fact that a significant share of Maltese may not have breakfast (and hence may not consider breakfast) as a main meal, and also that a high proportion of protein is eaten as an accompaniment to pasta dishes which may not be considered by some parents in Malta to constitute 'a dish with chicken, meat or fish'.([22])

([20]) To compute standard errors and confidence intervals, we controlled for household clustering as a proxy of the missing sample design information in the EU-SILC Users' Database (UDB).

([21]) Countries' official abbreviations are provided in Annex 5.

([22]) The issue was discussed between the Maltese National Statistical Institute and the Maltese Health Promotion Department, and the outcome of this discussion was a confirmation that these figures provide a realistic picture of the situation in Malta. The Maltese National Statistical Institute also ran a number of checks to determine whether these discrepancies might have been caused by interviewers' biases, and concluded that there were no significant inaccuracies in the questionnaire or during the data collection process which might have distorted the overall representation of the situation.

Figure 2: Children living in households 'wanting' fresh fruits/vegetables for them at least once a day, by country, 2009, (%)



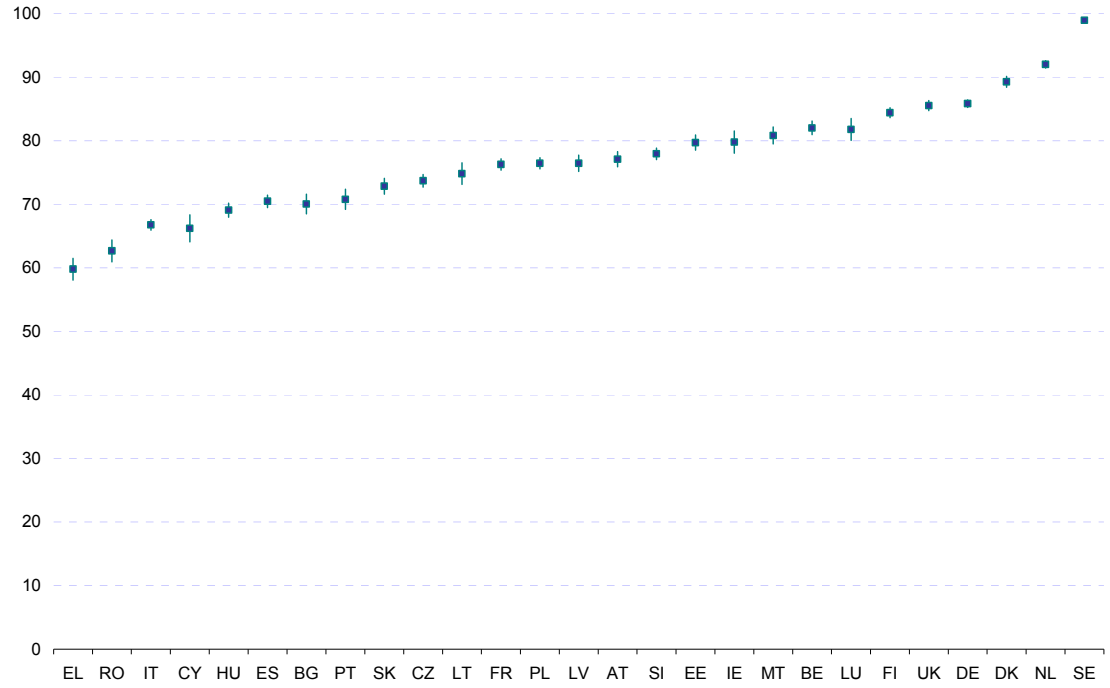
Notes: People who 'want' the item are people who have the item plus people who would like it but cannot afford it.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

For children's regular leisure activity, national percentages range from 65-70 % (SI, SK, MT, LT) to 92 % (IE). Such national variations do not necessarily reflect actual national differences in 'wanting' given that, as explained above, the 'No, for any other reason' category includes people who want this activity for their children but are prevented by other constraints that can differ between countries (availability of such activities, accessibility problems etc.). For the item 'Participating in school trips that cost money', this was wanted by 83 % in LU, 86-88 % in DE and RO… and 90 % or more in all other countries. However, the wording of the EU-SILC item may not be appropriate in countries where the law requires that school trips are free. As this item measures an essential dimension of child poverty and social exclusion, we have kept this item in our indicators but would suggest rewording it in future data collection.

For adult and household items, the proportion of people 'wanting' the various individual items varies more between countries than for child specific items but remains higher than 70 % in almost all countries. Exceptions are:

- adult leisure: however, in view of the wording problems discussed above we would be very reluctant to consider these national variations as evidence of suitability problems and we do not reject these items on this ground;
- Internet access: the proportion of persons living in households 'wanting' Internet access ranges from 63 % in Romania to 99 % in Sweden (see Figure 3; see also text below).

Figure 3: Persons living in households 'wanting' Internet, by country, 2009, (%)



Notes: People who 'want' the item are people who have the item plus people who would like it but cannot afford it.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 2 summarises the results of this first part of the suitability analyses (the second part is presented in Section 5.2) and presents three measures of suitability at EU and country levels, by item. The first column shows items which less than 70 % of the EU population want. Similarly, the last column provides information on the number of Member States where the 'wanting' rate is lower than 70 % and on the EU country with the lowest proportion wanting this item.

Table 2: Suitability – Summary of 'wanting' results, 2009

	Wanted by less than 70 % of the EU population	Member States (MSs) where the % of 'wanting' is less than 70 %
Household (Hhd) and adult items		
EU-SILC thematic MD module		
Hhd - Replacing worn-out furniture		1 Member State (HU), Min=68 % (HU)
Hhd - Internet access[*]		8 MSs (EL, RO, CY, IT, HU, BG, ES, PT). Min=63 % (RO)
Adult - Mobile phone		
Adult - Replace worn-out clothes		
Adult - Two pairs of shoes		
Adult - Get-together with friends		
Adult - Leisure activity	67 %	8 MSs (HU, IT, MT, PT, SK, BG, PL, CZ, EL) Min=60 % (HU)
Adult - Pocket money		
Core part of EU-SILC		
Hhd – TV		
Hhd – Computer		2 MSs (EL, IT) Min=65 % (EL)
Hhd – Phone		
Hhd - Washing machine		
Hhd – Car		
Children's items (all children's items were collected in the EU-SILC thematic MD module)		
Children - New, not 2nd hand clothes		
Children - Two pairs of properly fitting shoes		
Children - Fruits/vegetables once a day		
Children - Three meals a day		
Children - One meal with meat. once a day		
Children - Books at home		
Children - Outdoor leisure equipment		
Children - Indoor games		
Children - Regular leisure activity		4 MSs (SE, SI, SK, MT) Min=62 % (SE)
Children – Celebration		
Children - Invite friends		
Children - School trips		
Children - Holidays (optional)		

Notes: People who 'want' the item are people who have the item plus people who would like it but cannot afford it. MSs = Member States. The suitability of Internet and computer cannot be analysed separately given the format of the variables available. (*) As outlined in Section 3.5.1, to avoid duplication and also to make best use of the small amount of IT information available from EU-SILC, we have decided to combine it with computer ownership.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 2 shows that most items are 'wanted' by a very large majority of the population, at both EU and national levels. This is true not only for all children's items but also for the remaining items collected at household or adult level. Even for the more problematic items/countries, the proportion of people 'wanting' the item is not lower than 60 %. This provides *evidence in support of the use of a same set of items to analyse MD in the EU*. It accords with the conclusions of Dickes *et al* (2010), who pointed to a high level of 'structural congruence' between the national patterns of perceived social needs (using the 2007 Eurobarometer data), i.e. *'a high level of agreement among countries about what constitutes necessities of life'*.

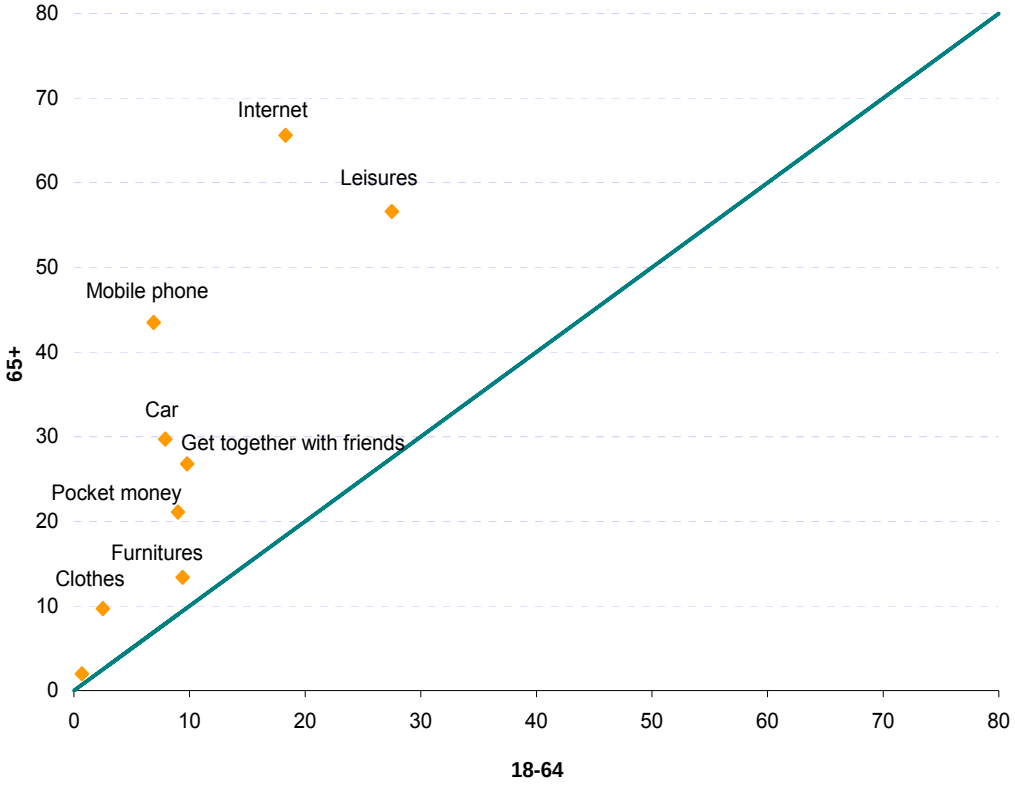
5.2. Suitability of the items between sub-groups within countries

Another condition put forward by Mack and Lansley (1985, pp. 59-83) for identifying a social consensus is that the consensus should be achieved not only in the population as a whole but also amongst social groups, i.e. there should be homogeneity of preferences *within countries*. As discussed by Pantazis *et al* (2006, p. 90) 'the validity of this consensual approach to measuring poverty rests on the assumption that there is a universal minimum accepted by society that also reflects actual living conditions. The implication of this, which is central to the approach, is that differences in views between social groups, including ranked social strata, concerning what constitutes an acceptable living standard are relatively small. Otherwise, the definition of an unacceptable standard of living just becomes the opinion of one group against the other.' One result of applying the consensus method in Britain is that usually 'the survey's findings show a remarkable degree of agreement about necessities of living' (Mack and Lansley (1985); see also Gordon and Pantazis (1997), Gordon *et al*, (2000)). Similar findings are obtained using the 2007 Eurobarometer data by Guio *et al* (2009) and Dickes *et al* (2010). In other studies, the degree of consensus may be more limited (see, for example: Van den Bosch, 2001).

Using EU-SILC data, we tested this homogeneity of preferences by looking at the proportion of 'wanting' (by item and country), broken down by socio-demographic variables such as gender, age, household type, population density, education, income quintile, 'poverty risk' status (EU definition; see above) and deprivation level (see also Guio (2009)).

The main result of our analysis is the high degree of consistency between groups about their level of 'wanting' the various items, which is a clear sign of homogeneity of preferences within countries. The variables were also entered in logistic regression models in order to test their impact 'other things being equal'. The results obtained show that age has the largest impact, i.e. for most items, the older the people are the lower their level of 'wanting'. This discrepancy between older people and other age groups can be seen particularly for items like leisure, car, Internet, mobile phone, etc. (see Figure 4).

Figure 4: People 'not wanting' the items by age group, EU-27, 2009, (%)



Notes: People 'not wanting' the item are those who do not have it but for other reasons than financial stress.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

It is worth remembering that an unavoidable limitation of a deprivation score is that the closer the preferences of an individual correspond to the list of items retained in the indicator, the less likely that person will appear to be deprived (Halleröd, 1995). As different age groups have a different probability to face MD in the list of selected items, the question is therefore whether MD indicators should be based on the same set of items for the whole population or whether they should rather address different needs that are specific to different age groups. In order to determine if this is necessary, Differential Item Functioning([23]) analyses (Osterlind & Everson, 2009) could be used in future work on adaptive preferences and potential measurement biases when comparing the MD of older people with that of their younger peers. For the following reasons, we have opted to focus on the whole population with a common set of items:

- the use of enforced lack (i.e. lack due to affordability reasons) helps to correct for the difference of wanting between age groups (see also below);
- respondents' income levels have an influence on the difference between age groups (see Figure 5). When controlling for income quintile, the differences between younger and older people are reduced – so, for example: younger people are more likely to 'want' a mobile phone across all income quintiles, but a high proportion of older people in the higher income quintiles also 'want' a mobile phone;

([23]) An MD item displays Differential Item Functioning if people from different groups (age, gender, etc.) but with the same underlying/latent deprivation level have a different probability of answering 'yes' or 'no' to a particular deprivation question, i.e. the deprivation question is 'biased'. For example, a 'deprivation' question which measured if a person could afford to buy 'jogging shoes' may not be answered in the same way by young adults and older people, due to factors completely unrelated to their deprivation levels - i.e., their ability to run/jog.

- the 2009 EU-SILC question response categories do not differentiate precisely between respondents who 'do not want' an item and those who 'do not have' the item for other reasons (e.g. inability to participate in leisure/sport activities for health reasons, problems of access, etc.)([24]);
- with the ageing of the population, with longer life expectancy and also with the reduction in the relative cost of many consumer durables, penetration rates of some items like mobile phones, computers and Internet access is likely to increase among older people in the near future; and
- a common MD measure for the whole population is highly desirable for the social inclusion 'headline target' agreed at EU level in June 2010 as part of the Europe 2020 Strategy (see above). It is consistent with the approach followed for the current EU MD indicator and is much easier to communicate.

Even though we believe that a common MD indicator should be computed for the whole population, including the elderly, there is a major problem with the full list of MD items available from the 2009 survey as this information may not allow for a comprehensive study of the living conditions of older people. A thematic module focusing on the situation of the older population would be very useful to complement the information currently available. At the same time, it is important to keep in mind that EU-SILC, as most household surveys, collects information exclusively about people living in private households: people living in institutions are thus not included in EU-SILC which, in some Member States, is likely to represent a serious problem for the analysis of older people's living conditions.

([24]) In their detailed cognitive analysis of the survey questions on material deprivation among older people in the UK, Legard *et al* (2008) suggest that: 'The questions were found not to work well because the reasons offered to respondents did not reflect the complexity of their circumstances.' Therefore, they recommend asking for more detailed reasons for not having/doing an item, such as:

'I do not have the money for this (affordability);

This is not a spending priority for me (priorities around spending);

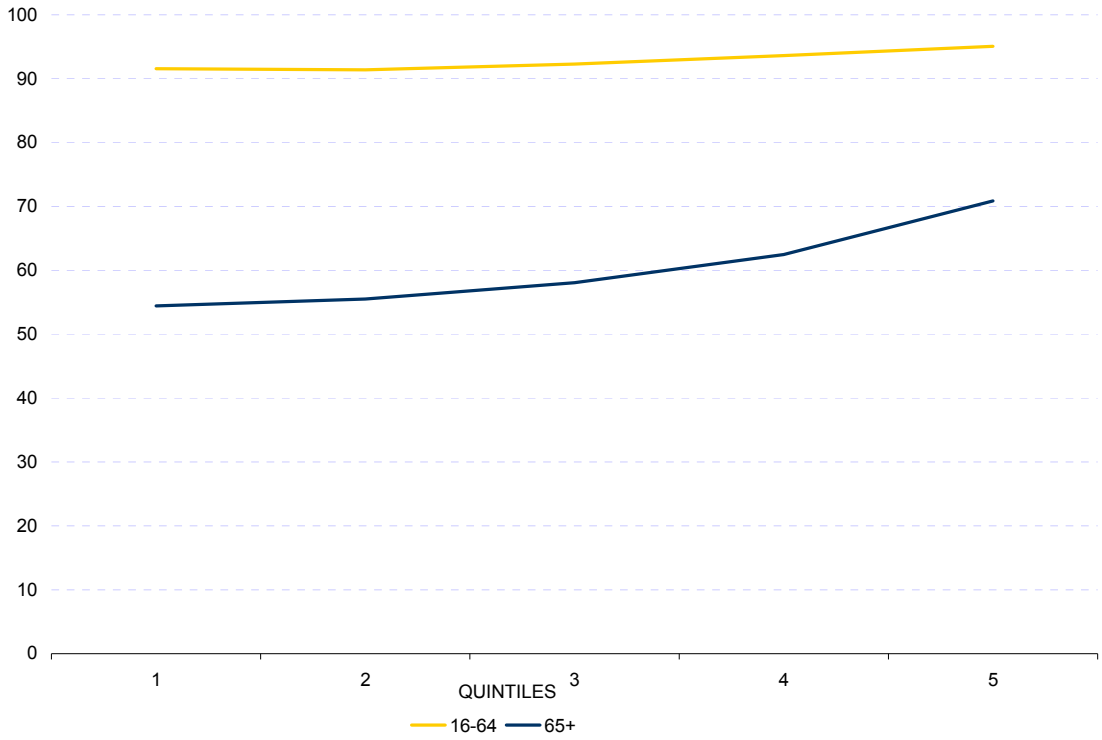
My health/disability prevents me;

It is too much trouble/too tiring;

There is no one to do this with or help me;

This is not something I want or need (irrelevance/lack of need).'

Figure 5: People 'wanting' Internet by age groups and income quintiles, EU-27, 2009, (%)



Notes: People who 'want' the item are people who have the item plus people who would like it but cannot afford it.

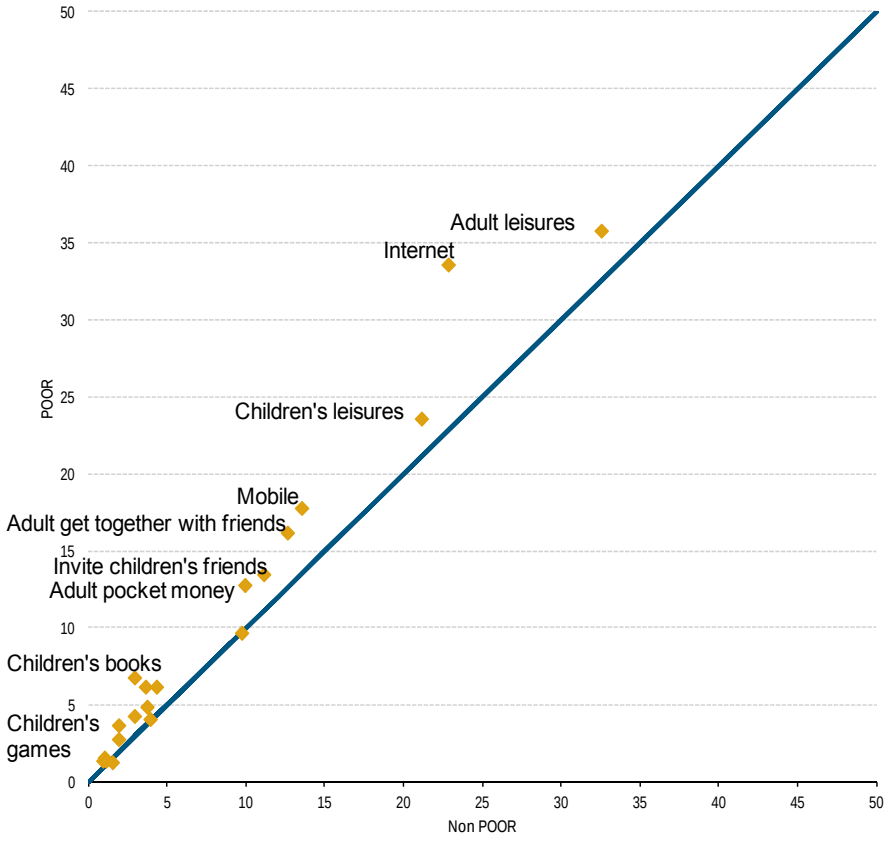
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

For some items, the analysis shows that the poorest, the least educated or the most deprived people are also the least likely to 'want' items (see Figure 6[25]). Possible explanations for this include:

- The poorest may have different priorities. They may be less sensitive to some items that are more prevalent in richer groups (books at home, eating fresh fruits and vegetables, etc...) and may choose to spend their money in a different way;
- another explanation may be the so-called 'adaptive preferences': individuals' expectations concerning their material well-being tend to decrease with long-term poverty and social exclusion - and, as a consequence, poor people may report that they do not want things, simply because they cannot afford them and have got 'used' to living without them (see Sen (e.g. 1985 and 2009) and also Halleröd (2006));
- some people may feel ashamed not to be able to afford some items for themselves or their children and may therefore prefer to respond that they do not want these items (as previously mentioned, information on the situation of children is collected from the household respondent and not the children themselves).

([25]) This holds true for most items in all countries, except in Romania for all children's items (the lower the income the higher the proportion not wanting the item).

Figure 6: People 'not wanting' the items by poverty risk status, EU-27, 2009, (%)



Notes: People not wanting the item are those who do not have it but for other reasons than financial stress.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

In order to take into account these potential biases, it might be possible to solely use the concept of 'enforced' lack when considering the whole population (0+) and the concept of 'simple' lack for *some basic children's items* (on the grounds that children need to be protected and do not always have a say in the decisions that concern them). However, simple lack can be difficult to interpret and can raise problems of comparability in relation to other differences in preferences and tastes (not all necessarily linked to income level). The use of enforced lack has been shown to produce more reliable and valid deprivation measures (Gordon, 2006). There are also strong theoretical reasons for preferring enforced lack over simply lack (Piachaud, 1981, Mack and Lansley, 1985). For all these reasons, we have chosen to only consider enforced lack in our analyses.

6. Validity of the full set of MD items

In line with our analytical framework (see Section 2.2), validity is a key requirement that each item has to fulfil to be an eligible candidate for the aggregate MD indicator. Validity tests aim to check whether an individual MD item exhibits statistically significant relative risk ratios with a set of independent variables known to be correlated with the latent construct of deprivation. We tested this by running binary logistic regressions for each MD item (dependent variable) against independent variables known to be correlated with MD.

6.1. Criteria and results for the whole population (0+)

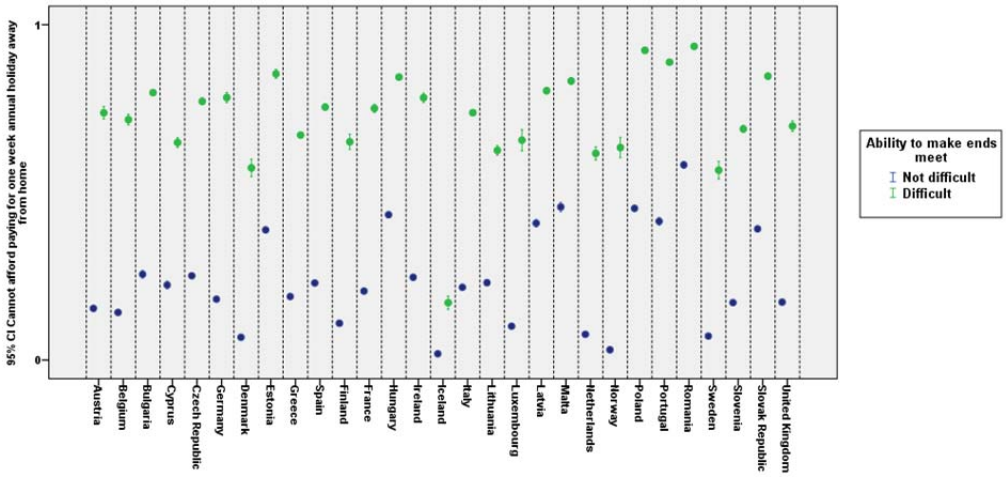
In the case of the whole population, three variables were used([26]):

1. At-risk-of-poverty (AROP), which is known to be closely related to MD although the overlap is far from perfect for a variety of reasons (Berthoud *et al* (2004); Fusco *et al* (2010); Marlier *et al* (2012), Nolan and Whelan (2011), Chapter 6). Even though the cross-sectional association between low income and deprivation is often lower than might be expected (Perry (2002); Whelan (1997)), there is a long tradition of using this association to validate deprivation indicators. Both Peter Townsend (1979) and Mack and Lansley (1985) used the correlation between income and deprivation to select their items.
2. Subjective poverty ('great difficulties' or 'difficulties' with making ends meet), which is often used as a measure of financial stress, is closely related to MD (see, for example, Nolan and Whelan, 2011). It would be expected from Townsend's theory of relative deprivation and Mack and Lansley's concept of 'consensual poverty' that someone who is 'deprived' would also consider themself as suffering from financial stress (Bradshaw and Finch, 2003).
3. Self-reported health status ('limitations' or 'strong limitations' in activities because of health problems, for which we used multivariate logistic regressions in order to control for age and gender), as thousands of studies have shown that people suffering from deprivation have a higher probability of developing health problems and that there is a strong association between living/growing up in poverty and deprivation and having worse health. The relationship can go into both directions, i.e. health problems can also impact on permanent income and MD. So, as stated by Fusco *et al* (2010, p. 148): '*The presence of at least one person in bad health (self-defined status) in the household (...), in all but four [EU-27] countries (Estonia, Luxembourg, the Netherlands and Finland) does have an impact on the risk of deprivation (...). An explanation for this might be that health is more related to permanent than to current income.*' While ill health may sometimes be a cause of poverty/ deprivation, the available evidence suggested that 'poor' people are much more likely to become 'sick' than 'sick' people are to become 'poor', i.e. the direction of causality is strongly weighted towards deprivation/ poverty causing ill health rather than ill health causing poverty/ deprivation (Commission on the Social Determinants of Health, 2008; Gordon *et al*, 1999; Leon & Walt, 2001; Power *et al*, 1991, 1996; Shaw *et al*, 1999; Wilkinson 1996, 1999). Our own results, based on EU-SILC 2009, also confirm that the relation at the individual level between the health status and the level of the current EU MD indicator is significant in all Member States.

([26]) This means that 2,520 regressions were run on the whole population [30 items * 28 geographical variables (27 EU countries plus pooled EU data) * 3 independent variables].

Here, we consider that an item has validity problems if the results of the logistic regressions are not significant in two out of our three validity tests. We reject an item as 'invalid' if it has validity problems in more than two out of 26 Member States (Sweden not being included because of the large proportion of missing cases for all module items in that country (around 40 %)). The method is illustrated in Figure 7, where the mean and 95 % confidence interval of the proportion of people (whole population) who cannot afford one week's holiday away from home, broken down by subjective poverty, are shown at country level. This Figure shows a clear separation between the upper and lower error bars in all countries, which means that an enforced lack of holiday is significantly associated with subjective poverty in all 27 EU Member States.

Figure 7: Validity error bar plot - People who cannot afford a holiday by subjective poverty ('great difficulties' or 'difficulties' with making ends meet), whole population, 2009, (%)



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 3 summarises the results of the validity tests for the whole population.

Table 3: Number of Member States with validity problems (i.e., non-significant relation between a given item and at least two of the following: income poverty (AROP), subjective poverty and health problems), whole population, 2009

WHOLE POPULATION	Income poverty	Subjective poverty	Health	MSs with two validity problems (out of three)
The person cannot afford (but would like to have):				
A mobile phone	0	1	1	
Some new clothes	0	0	0	
Two pairs of shoes	0	1	0	
Pocket money	0	0	0	
Drink/meal monthly	0	0	0	
Leisure activities	0	0	0	
The household's dwelling suffers from:				
Basic amenities	2	3	3	MT
Shortage of space	4	0	11	
Darkness	3	0	0	
Leaky roof, damp, etc.	0	0	0	
Litter lying around	8	0	2	MT
Vandalism	9	0	6	MT
Noise	5	1	2	
Pollution	8	0	5	IE,MT
Crime	8	1	3	AT
Overcrowding	1	0	8	
High housing costs	0	0	12	
The household cannot afford:				
To replace worn-out furniture	0	0	0	
A meal with meat, chicken or fish	0	0	0	
To face unexpected expenses	0	0	0	
To keep home adequately warm	0	0	0	
One week annual holiday away from home	0	0	0	
Avoiding arrears	0	0	0	
A washing machine (enforced lack)	0	0	10	
A colour TV (enforced lack)	**3**	**3**	**10**	**CY, EL, IE, LU**
A telephone (enforced lack)	**5**	**3**	**11**	**CY, DK, LU, NL (SE)**
A computer/Internet (enforced lack)	0	0	4	
A personal car (enforced lack)	0	0	0	
The household has a (very) difficult access to:				
Public transport	7	4	1	AT, MT
Postal/banking services	5	2	3	FR, LU

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

6.2. Criteria and results for the child population

In the case of the child population, only income poverty (AROP) and subjective poverty were used, as EU-SILC does not collect information about children's health status. An item showing non-significant relation with both income and subjective poverty in more than two Member States is rejected as non-valid. Table 4 summarises the results of the validity tests for the child population.

Table 4: Number of Member States with validity problems (i.e., non-significant relation between a given item and both income poverty (AROP) and subjective poverty), child population, 2009

CHILD POPULATION	Income poverty	Subjective poverty	MSs with two validity problems (out of two)
The household cannot afford (for at least one child):			
Some new clothes	2	2	EL
Two pairs of shoes	3	2	EL
Fresh fruits & vegetarian daily	3	7	CY, LU (SE)
Three meals a day	**7**	**12**	**AT, DK, EE, EL, LU (SE)**
Meat, chicken, fish (vegetarian)	2	4	FI (SE)
Suitable books	2	5	UK
Outdoor leisure equipment	0	0	
Indoor games	3	5	IE, NL (SE)
Place to do homework	3	2	LU
Dentist (optional)	**3**	**3**	**FI, LT, SI**
General practitioner (optional)	**4**	**4**	**FI, LT, SI, UK**
Leisure activities	0	0	
Celebrations	1	1	
Invite friends	1	1	FI
School trips	0	3	
Outdoor space to play	7	3	CY
Holiday (optional)	0	0	
The household's dwelling suffers from:			
Basic amenities	**5**	**10**	**AT, IE, MT, UK**
Shortage of space	2	2	
Darkness	7	3	
Noise	**10**	**8**	**AT, LV, SK**
Pollution	**12**	**6**	**CY, EE, IE, MT**
Crime	**13**	**6**	**AT, LT, LU, PT, SI**
Leaky roof, damp, etc.	5	0	
Inadequate warmth in home	1	0	
High housing costs	0	1	
Overcrowding	1	2	NL

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 4 (continued):

CHILD POPULATION	Income poverty	Subjective poverty	MSs with two validity problems (out of two)
The household's dwelling suffers from:			
Litter lying around	**9**	**3**	**CY, EE, SI**
Vandalism	12	2	CY
The household cannot afford:			
To replace worn-out furniture	0	0	
To face unexpected expenses	0	0	
To avoid arrears	0	0	
A telephone	**16**	**16**	**AT, CY, CZ, DK, EE, EL, FI, IE, LT, LU, NL, PL, SI (SE)**
A colour TV	**16**	**17**	**CY, CZ, EE, EL, ES, FR, IE, LT, LU, LV, MT, NL, PT, UK**
A computer & Internet	0	0	
A washing machine	**14**	**11**	**AT, CZ, DK, EL, IE, LU, MT, NL, SI**
A car	0	0	
The household has a (very) difficult access to:			
Public transport	**9**	**10**	**BE, DE, DK, ES, FI, MT (SE)**
Postal or banking services	**8**	**6**	**AT, ES, SK**

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

6.3. Conclusions

For the *whole population*, two items had to be rejected on validity grounds: 'a colour TV' and 'a telephone'. All the other items are valid, i.e. they have either no validity problems in any Member State or they have validity problems in a maximum of two out of the 26 Member States (Sweden not being included because of the large proportion of missing values).

For the *child population*, 13 items have to be rejected on validity grounds: 'three meals a day', 'to consult a dentist when needed', 'to consult a GP when needed', 'basic housing amenities', 'noise', 'pollution', 'crime', 'litter lying around', 'a telephone', 'a colour TV', 'a washing machine', 'public transport', 'Postal and banking services'. All the other items are valid, i.e. they have either no validity problems in any Member State or they have validity problems in maximum two countries (Sweden not being included).

The type and number of items which do not pass the validity tests differ between the child population and the whole population due to different behaviours of households with and without children. Furthermore, the sample size is smaller for the child population which means that measurement errors are larger.

All the items that pass the validity tests are *valid to measure MD across the whole EU*, as they fulfil the very demanding criterion we have imposed – i.e. to be valid in at least 24 Member States. This means that all these deprivation items exhibit a clear *social gradient* with income, financial strain and health in virtually all EU countries.

We now turn to the reliability of the full set of MD items.

7. Reliability of the full set of MD items - Classical Test Theory (CTT)

Reliability was tested using Classical Test Theory (Nunally, 1978) and Item Response Theory (IRT, see Section 9). Cronbach's alpha assesses the internal consistency of a scale, i.e. how closely related a set of items are as a group. A 'high' value of Alpha is often used as evidence that the set of items measure an underlying (or 'latent') construct. It is computed as a function of the number of items and the average inter-correlation among them. An Alpha of 0.70 or higher is considered as 'satisfactory' in most social science research situations (Nunally, 1978).

7.1. CTT applied to the whole population (0+) - Results and conclusions

We tested the reliability of the deprivation scale composed of all the MD items relevant to the whole population (0+), i.e. including those items that had previously failed our validity tests. If omitted (one by one), the items highlighted with an 'α' in Table 5 (Section 8) increase the deprivation scale reliability, as indicated by an increase in the Cronbach's alpha statistic. These analyses were performed for both the EU as a whole and for each individual country. A MD item was excluded if it was unreliable in three or more countries. Thus, we retained only those items that were reliable in at least 25 EU countries. This is the same exclusion criteria we used in our validity tests.

The 14 items which failed our reliability test are:

1. Some basic durables (TV, telephone, washing machine) and basic commodities (toilet, hot running water, bath), which is consistent with the fact that these items appear as a separate dimension in our analysis of the dimensional structure (see Section 4);
2. the two items related to problems of accessibility, i.e. access to postal/banking services and to public transports, which again is consistent with our dimensional analysis results (these items are clustered in a very distinct dimension);
3. items which measure local environment problems (crime, noise, pollution, litter lying around, vandalism), again, a result which is consistent with our dimensional analysis;
4. three important items related to housing: overcrowding, dark dwelling and high housing costs.

It should be highlighted that this pattern is very consistent across countries. The number of reliable items per country does not vary much (between 21 (PL) and 27 (BE, CY, FI); 22 at the EU-27 level) and the reliability problems tend to occur repeatedly with the same items.

7.2. CTT applied to the child population – Results and conclusions

We tested the reliability of the scale encompassing the whole set of available MD items for the child population, i.e. including also those items that failed our validity tests. If omitted (one by one), the items highlighted with an 'α' in Table 6 (see Section 8) increase the Alpha.

Using again the same number of countries criterion (i.e., to pass the reliability test, an item has to be reliable in at least 25 out of the 27 EU countries), the results are as follows:

1. Among children's items, four items did not pass the test: the affordability of three meals a day, the availability of outdoor space to play safely, to consult a dentist when needed and to consult a GP when needed.
2. The household items show similar reliability performances when the analysis is carried out for the entire population or when it is restricted to the child population:

- Out of the 14 items that had reliability problems for the entire population, 13 also have reliability problems for the child population. The exception is 'Overcrowding', which captures space problems on the basis of the number of persons in the households and taking into account the age/gender of children. Overcrowding just passes the test as it is unreliable in 2 countries.
- By contrast, two items that were reliable for the 0+ age range are not reliable for the 1-15: 'shortage of space' (reliability problems in three countries) and 'Leaking roof' (reliability problems in four countries, including Sweden).

8. Overview of the suitability, validity, reliability (CTT) tests at the EU and country level

Tables 5 and 6 summarise the various tests performed so far (i.e. the suitability, validity and reliability [CTT] tests; see Sections 5-7) and present the results at both the EU and country levels.

In Section 9, we will apply an additional test (Item Response Theory [IRT]) to the MD items that successfully passed all these preceding tests. We will also apply it to the housing items; as we saw above, these items were 'borderline' and additional evidence is therefore useful before deciding whether they should be kept or rejected. In Section 11, additivity tests were performed on the items that passed all the previous tests.

8.1. Whole population

Table 5: Summary of the suitability, validity and reliability tests, item by item, EU and country levels, whole population, 2009

ITEM	EU	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Ad: Mobile phone																												
Ad: Some new clothes																												
Ad: Two pairs of shoes																												
Ad: Pocket money																												
Ad: Drink/ meal monthly																												
Ad: Leisure activities			(S)	(S)					(S)			(S)					(S)	(S)			(S)	(S)			(S)			
Hhd: Arrears																												
Hhd: Basic amenities			α		α	α		α		α	α	α				α		V, α	α								α
Hhd: Short. of space														α														
Hhd: Darkness	α																							α				α
Hhd: Leaky roof, damp																												
Hhd: Litter lying around							α								α		α	V			α			α				
Hhd: Vandalism									α								α	V			α							
Hhd: Noise	α						α		α			α								α	α	α	α					
Hhd: Pollution	α						α		α			α			α			V, α			α		α	α				

Notes: Ad: adults; Hhd: household; S: suitability problems; V: validity problems; α: reliability (CTT) problems. '(S)' has been used for Leisure activities in order to highlight that even though the suitability criterion may not be met for this item, we have not rejected it on reliability grounds for the reasons discussed in Section 5.1.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 5 (continued):

ITEM	EU	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Hhd: Crime	α		α				α		α					α						V, α		α	α	α				
Hhd: Overcrowding			α											α	α				α				α		α			
Hhd: High housing costs	α		α		α	α	α	α			α		α	α	α		α	α	α		α	α	α	α	α			
Hhd: Worn-out furniture																	S											
Hhd: Meat...																												
Hhd: Unexpected expenses																												
Hhd: Home warm																												
Hhd: Holiday																												
Hhd: Washing machine				α		α				α	α	α				α	α	α	α		α			α				
Hhd: Colour TV	α			α		α	α	V, α	V, α	α	α	α	V, α		α	V, α	α		α		α	α			α			α
Hhd: Telephone		α			V, α	α		α					V, α			V, α			V, α					α		α	V, α	α
Hhd: Computer/ Internet																											α	
Hhd: Car																												
Hhd: Post/bank	α	α	α	α	α	α		α	α	α	V, α	α		α	α	V, α	α	α	α	α	α	α			α	α	α	α
Hhd: Public transport	α	α	α	α	α	α		α	α	α	α	α		α		α	α	V, α	α	V, α	α	α		α	α	α	α	α

Notes: Ad: adults; Hhd: household; S: suitability problems; V: validity problems; α: reliability (CTT) problems.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

8.2. Child population

Table 6: Summary of the suitability, validity and reliability tests, items by items, EU and country levels, child population, 2009

ITEM	EU	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Ch: Some new clothes									V																			
Ch: Two pairs of shoes									V																			
Ch: Fresh fruits & veg daily													V			V											V	
Ch: Three meals a day				α	V		V		V				α			V, α				V, α						α	V	
Ch: Meat, chicken, fish																										V, α	V	
Ch: Suitable books																												V
Ch: Outdoor leisure equipment																				V							V	
Ch: Indoor games								V								V												
Ch: Place to do homework																α			α									
Ch: Unmet need, dentist	na	na		na	na	na	α			na					V, α		na		na	na				V, α		V, α	na	α
Ch: Unmet need, GP	na	na		na	na	na	V, α	α		na					V, α		na		na	na				V, α		V, α	na	V, α
Ch: Leisure activities																												
Ch: Celebrations																										α		
Ch: Invite friends																										V, α		

Notes: Ch: children; Hhd : household; S: suitability problems; V: validity problems; α: reliability (CTT) problems; na=optional.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 6 (continued): Summary of the suitability, validity and reliability tests, items by items, EU and country levels, child population, 2009

ITEM	EU	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Ch: School trips																												
Ch: Outdoor space	α						α		α	α		α	V, α	α	α	α	α	α			α	α	α		α		α	
Ch: Holiday	na	na		na	na			na		na					na		na		na								na	
Hhd: Basic amenities		α			α	α		V			α	α				α		V, α	α	V, α						α	α	V, α
Hhd: Shortage of space														α		α												α
Hhd: Darkness		α																						α			α	α
Hhd: Noise	α		α	α			α		α	α		α		V, α	α		α			V, α	α	α	α		V, α			
Hhd: Pollution	α		α		α	α	V, α	V, α	α	α	α	α	V, α	α	α	α	α	V, α		α	α	α	α	α	α		α	α
Hhd: Crime	α	α	α				α		α	α		α	α	α	V, α	V, α		α		V, α		V, α	α	V, α	α		α	
Hhd: Leaky roof, damp		α														α				α							α	
Hhd: Home warm																												
Hhd: High housing cost	α		α		α	α	α	α			α		α	α	α		α	α	α		α	α	α	α	α	α		α
Hhd: Overcrowding							α												V, α									
Hhd: Litter lying around	α						V, α		α				V, α		α		α				α	α	α	V, α	α			

Notes: Ch: children, Hhd : household; S: suitability problems; V: validity problems; α: reliability (CTT) problems; na=optional.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 6 (continued): Summary of the suitability, validity and reliability tests, items by items, EU and country levels, child population, 2009

ITEM	EU	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Hhd: Vandalism			α				α		α				V, α	α			α				α		α		α			
Hhd: Worn-out furniture																												
Hhd: Unexpected expenses																												
Hhd: Arrears																												
Hhd: Telephone		α		V	V, α	α	V, α	V	V	α			V, α	α	V, α	V, α			V, α	V, α	V, α	α		V, α	V	V, α	V, α	
Hhd: Colour TV	α	α		V, α			V, α	V	V, α	V, α	V, α	α	V, α	V, α	V, α	V, α	α	V	V, α	α	α	V, α			α		α	V, α
Hhd: Computer/ Internet																											α	
Hhd: Washing machine				V	V	α		V, α	V, α		α	α				V, α	α	V, α	V, α	V, α	α	α		V				
Hhd: Car																												
Hhd: Public transport	α	V, α	α	α	V, α	V, α		α	α	V, α	α	α		α	α	α	α	V, α	α	α	α	α	α	α	α	V, α	V, α	α
Hhd: Post/bank	α	α	α	α	α	α		α	α	V, α	α	α	α	α	α	α	α	α	α	V, α	α	α		α	V, α	α	α	α

Notes: Hhd – household; S: suitability problems; V: validity problems; α: reliability (CTT) problems.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

9. Additional test based on Item Response Theory (IRT)([27])

It is possible to obtain useful additional information on the properties of each individual item in the proposed MD indicators using Item Response Theory (IRT) models. Classical Test Theory (Section 7.1) provides information on the reliability of a scale/MD index as a whole, whereas IRT provides additional information on the reliability of each individual item in the scale/index. IRT, also known as Latent Trait Analysis, is a set of statistical models which describe the relationship between a person's response to questionnaire items and an unobserved latent trait such as knowledge of biology, level of happiness or amount of material deprivation. This is generally shown with item characteristic curves, which are modelled by the main parameters (severity and discrimination). It is often used for the selection of questions in assessment and for psychological testing. It has also been used for the measurement of poverty (e.g., Martini and Vanin, 2010; Raileanu Szeles and Fusco, 2011; Fusco and Dickes, 2008; Cappellari and Jenkins 2007).

The IRT model assumes that 'deprivation' is an unobservable latent trait which cannot be measured directly, like say height or weight, as it is a concept rather than a physical entity. However, it is assumed that this concept of 'deprivation' can be measured indirectly using social survey questions about respondent's ability to afford certain consumer durables and to participate in social activities. The 'severity' of a deprivation item in an IRT model is defined by the likelihood that the person/household will lack/not be able to afford that item, thus it is desirable that a deprivation indicator should include items with a range of different 'severity' scores i.e. some low severity items, some medium severity items and some high severity items. In IRT models, the 'discrimination' of a deprivation item measures how well this item differentiates between the deprived and the not-deprived, thus high 'discrimination' scores are desirable. The purpose of a deprivation indicator is to measure how much of the latent trait 'deprivation' a person/household suffers from.

It is assumed that the items included in the deprivation indicator measure only one latent trait (unidimensionality). There is no consensus on how unidimensionality may be established, but factor analysis may give researchers an idea of the data structure (as shown in Section 3). It should be noted that unidimensional IRT models are robust to moderate degrees of multidimensionality as defined by factor analyses, particularly where the dimensions are highly correlated and/or where the test/index length is more than 20 items and/or the sample size is more than 250 (Kirisci *et al*, 2001). Local independence is also an important assumption, i.e. responses to a test item do not depend on other test item responses once trait is taken into account. This is an assumption shared by most statistical models and is partly a reflection of the unidimensionality assumption.

We have applied a two-parameter IRT test to each of the MD items that were not excluded on the basis of the validity and reliability (Cronbach's alpha) tests, even if some of the housing ones were clearly 'borderline' as we saw above. It is important to highlight that in these models the parameters cannot be compared across countries. In other words, one cannot state that the severity or discrimination for a given item is lower/ higher in country X compared with country Y. However, parameters can be compared within the same country.

([27]) This section was prepared by Marco Pomati (University of Bristol).

9.1. IRT applied to the whole population

9.1.1. Severity at EU level

Table 7 shows the two-parameter IRT results for each of the 18 retained MD items. The column marked 'severity' can be interpreted as the likely severity of MD suffered by a person who lacks this item because he/she cannot afford it ('enforced lack'; see above). The severity scores in this table are measured in units of standard deviation from the average. The table shows that respondents who cannot afford an annual holiday or cannot face unexpected expenses have the lowest MD severity score, while those who consider their dwelling too dark are likely to be much more severely deprived. Here, we set the severity criterion at 3 standard deviations from the mean - i.e., we drop all items with a severity greater/ lower than 3 standard deviations. In this EU level analysis, only the item 'dwelling suffers from darkness' does not meet this criterion. This item is associated with a very high level of MD, which means that it only applies to a very small part of the sample (those who have a MD of 4 standard deviations), making it unsuitable for the reliable measurement of MD in surveys with relatively small sample sizes.

9.1.2. Discrimination at EU level

The discrimination columns in Table 7 indicate how well each item discriminates between the deprived and non-deprived respondents, and can be expressed as IRT parameters (third column) or translated into factor loadings (second column). These can also be transformed into correlations (ranging between -1 and +1) between items and MD (last column). The discrimination criterion we use here is to drop all items whose correlation with MD is lower than 0.4. At EU level, 3 items do not fulfil this condition: dwelling with a leaking roof, dark dwelling and dwelling with shortage of space, which all have low correlations (below 0.4) with MD. Overcrowding also has a relatively low correlation when compared to the other items, but it is above 0.4.

9.1.3. 'S' shaped curve at EU level

The ability of each item to measure severity is shown by the position of each asymptotic (i.e. 'S' shaped) curve([28]) along the X-axis – the further to the right the more severe the deprivation. The ability of each item to discriminate between the deprived and non-deprived people/ households is shown by how vertical each curve is with respect to the y-axis; the more upright the better the discriminating ability of the item and the higher its correlation with MD.

Ideally, a 'good' MD index would be illustrated by a series of fairly vertical 'S' shaped curves spread out along the X-axis. The inflection point of each curve, that is, half the distance between the upper and lower asymptotes, where the slope is steepest, should lie between 0 and +3 on the X-axis. In other words, have a severity of between 0 and +3 standard deviations. If the inflection point lies below 0 on the X-axis (for example at a severity of -1) then more than half the population are likely to suffer from this form of deprivation and so it is unlikely to be a good indicator. As shown in Figure 8, darkness, shortage of space and leaky roof stand out as items which conform less to the ideal pattern, darkness being the strongest outlier.

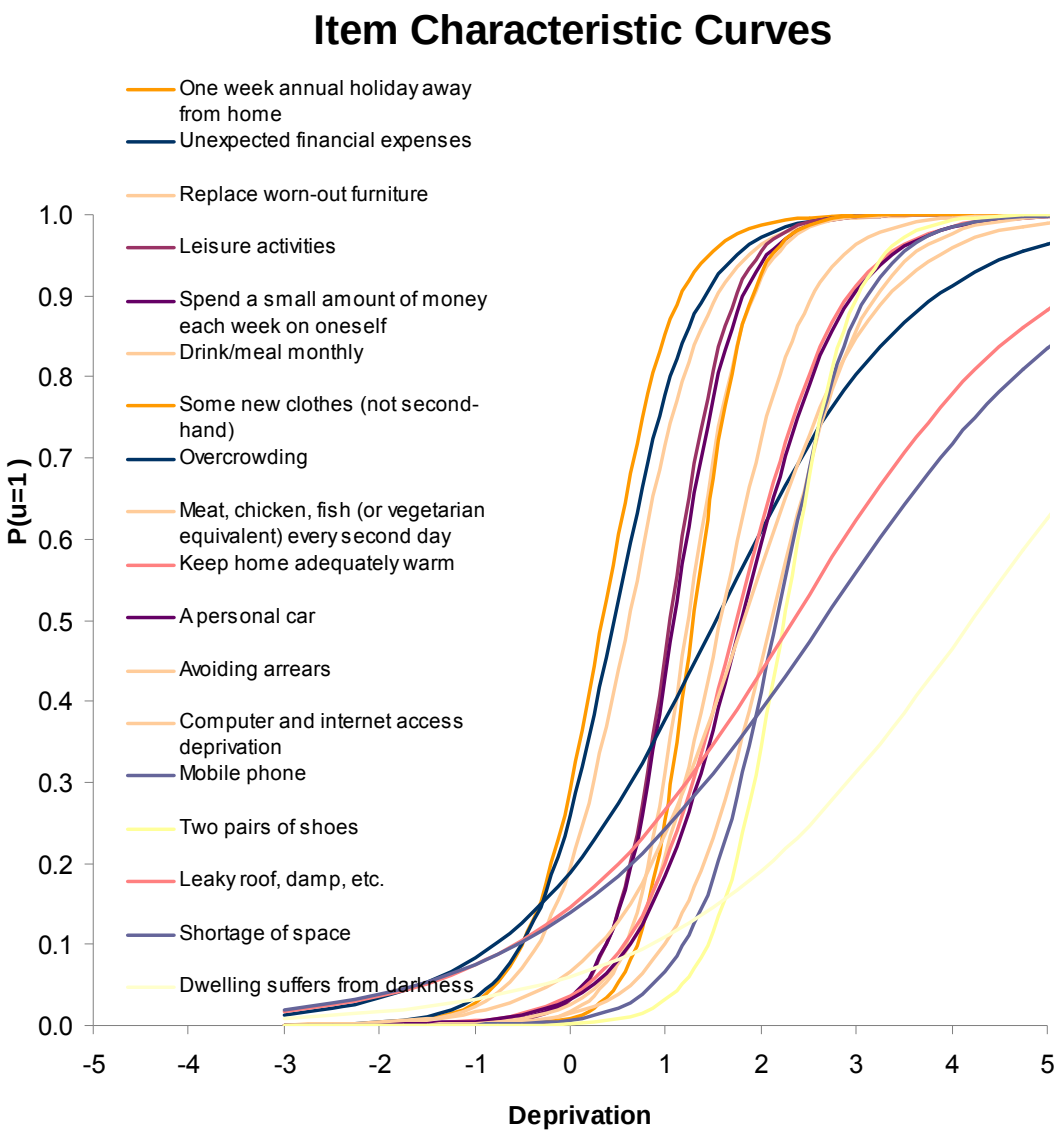
([28]) In IRT these S-shaped curves are called Item Characteristic Curves.

Table 7: IRT results for the 18 items retained for the whole population MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009

	Severity	Discrimination		Correlation with MD (standardised loadings)
		Loading	IRT Parameterisation	
One week annual holiday away from home	0.3	2.6	1.6	0.83
Unexpected financial expenses	0.5	2.3	1.4	0.79
Replace worn-out furniture	0.6	2.3	1.4	0.79
Leisure activities	1.1	3.2	2.0	0.87
Spend a small amount of money each week on oneself	1.1	3.04	1.8	0.86
Drink/meal monthly	1.2	3.28	1.9	0.88
Some new clothes (not second-hand)	1.3	3.6	2.1	0.89
Overcrowding	1.5	0.95	0.6	0.47
Meat, chicken, fish (or vegetarian equivalent) every second day	1.6	2.3	1.4	0.79
Keep home adequately warm	1.7	1.9	1.1	0.72
A personal car	1.8	1.9	1.1	0.72
Avoiding arrears	1.8	1.4	0.9	0.62
Computer & Internet access deprivation	2.1	2.0	1.2	0.74
A mobile phone	2.2	2.3	1.3	0.78
Two pairs of shoes	2.2	2.8	1.6	0.84
Leaky roof, damp, etc.	2.4	0.8	0.4	**0.39**
Shortage of space	2.7	0.7	0.4	**0.36**
Dwelling suffers from darkness	**4.2**	0.7	0.4	**0.34**

Notes: Log Likelihood is -3128510. Highlighted cells are those with values above the severity threshold (3) or below the discrimination threshold (0.40).
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 8: IRT results for the 18 items retained for the whole population MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009

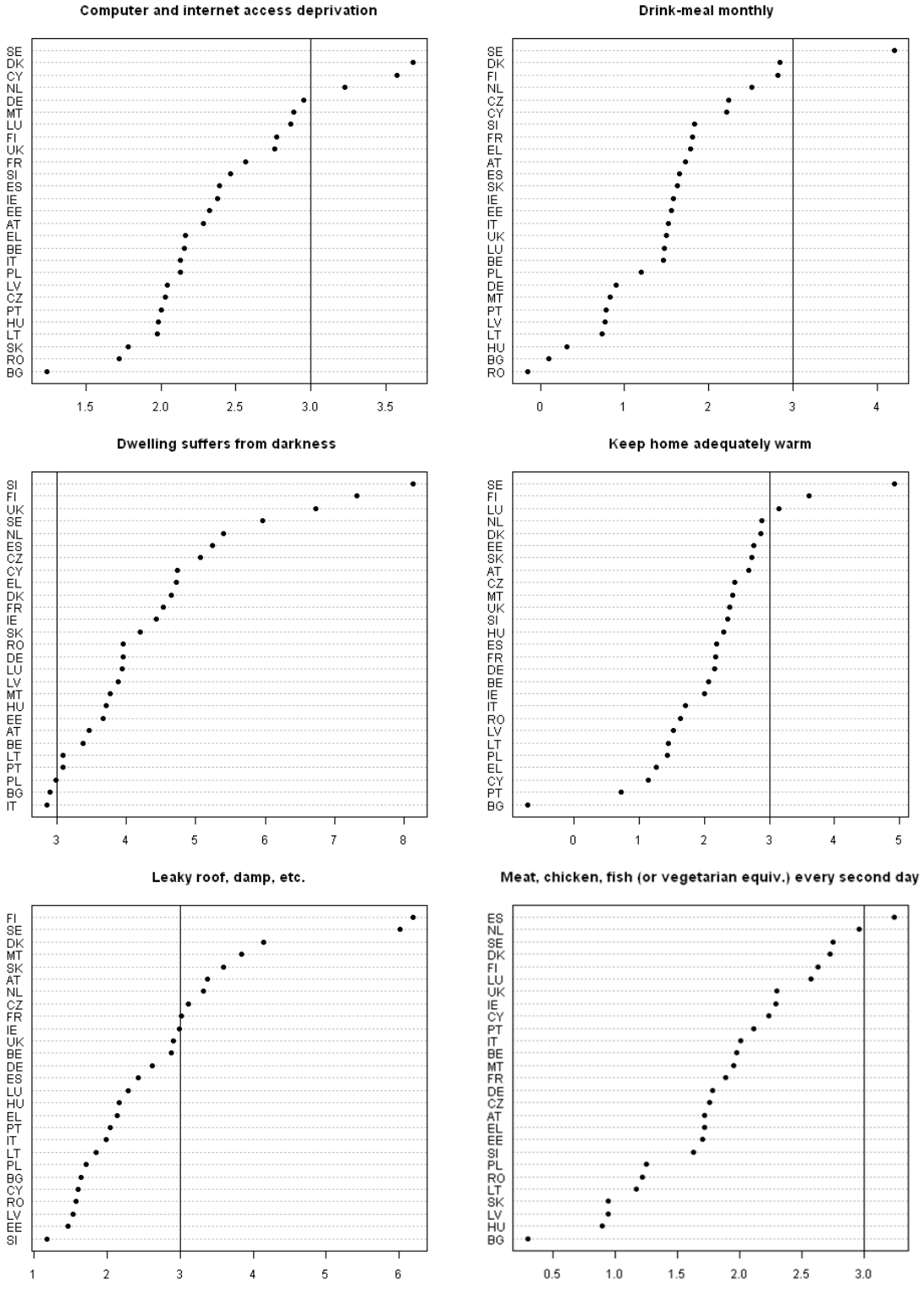


Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

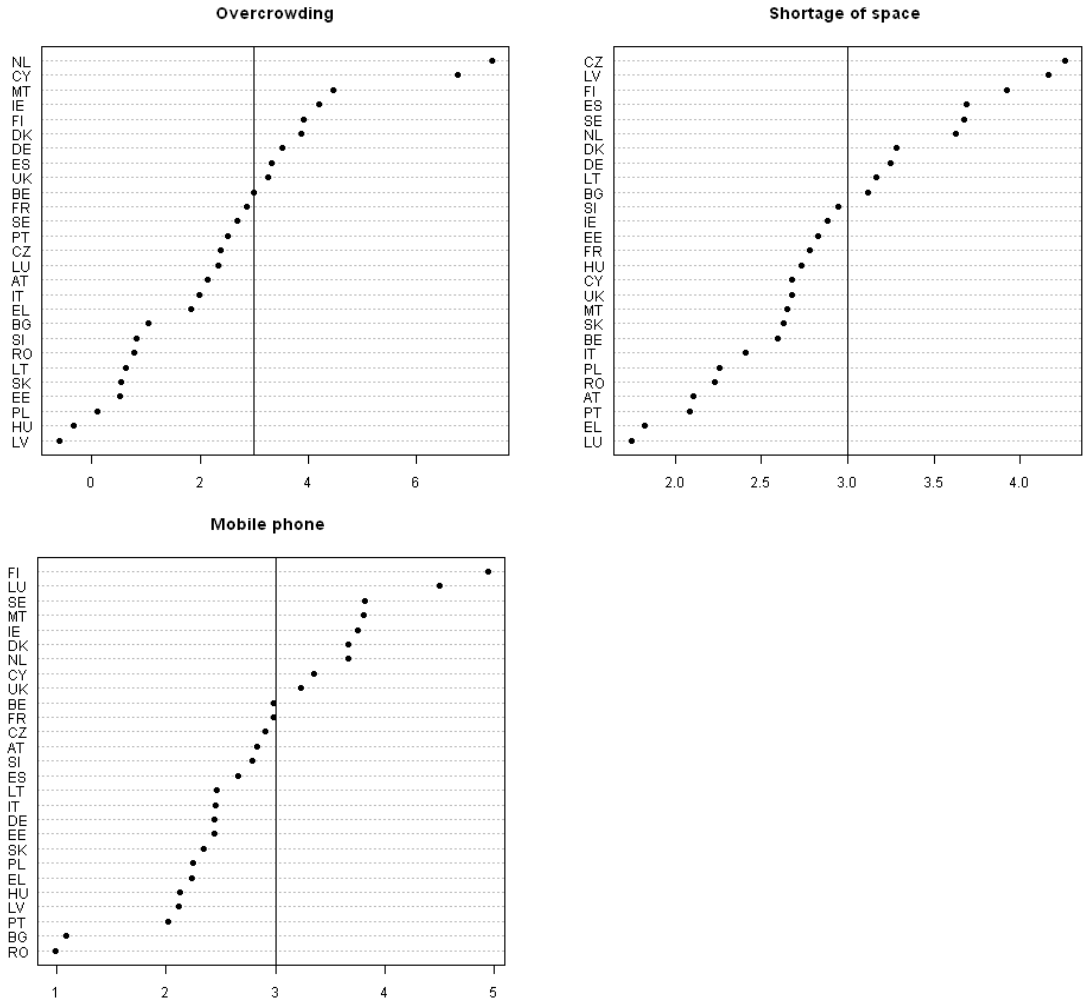
9.1.4. Severity at national level

As shown by Figure 9, four housing items (leaking roof, overcrowding, shortage of space and dark dwelling) have severity above 3 standard deviations (i.e. the threshold we have used) in many EU Member States, which means that these items do not satisfactorily measure MD among the vast majority of EU countries. On top of these housing items, we see that 'mobile phone' is also associated with extremely high levels of MD in many EU countries; and computer/Internet has severity problems in three Member States, i.e. just above our severity threshold. The other items do not have severity problems in more than two Member States (our reliability criterion) and therefore pass this severity test at national level. Due to the large proportion of missing cases for all module items in Sweden (around 40 %; see above), this country is not taken into account. Only the nine items with one or more severity problem(s) are presented in Figure 9. The remaining nine items fulfil our criterion in all Member States.

Figure 9: Severity parameters for national models (whole population)([29]), 2009



([29]) Sweden's parameter for 'Computer and Internet access' deprivation was excluded because there were no cases lacking this item in that country.

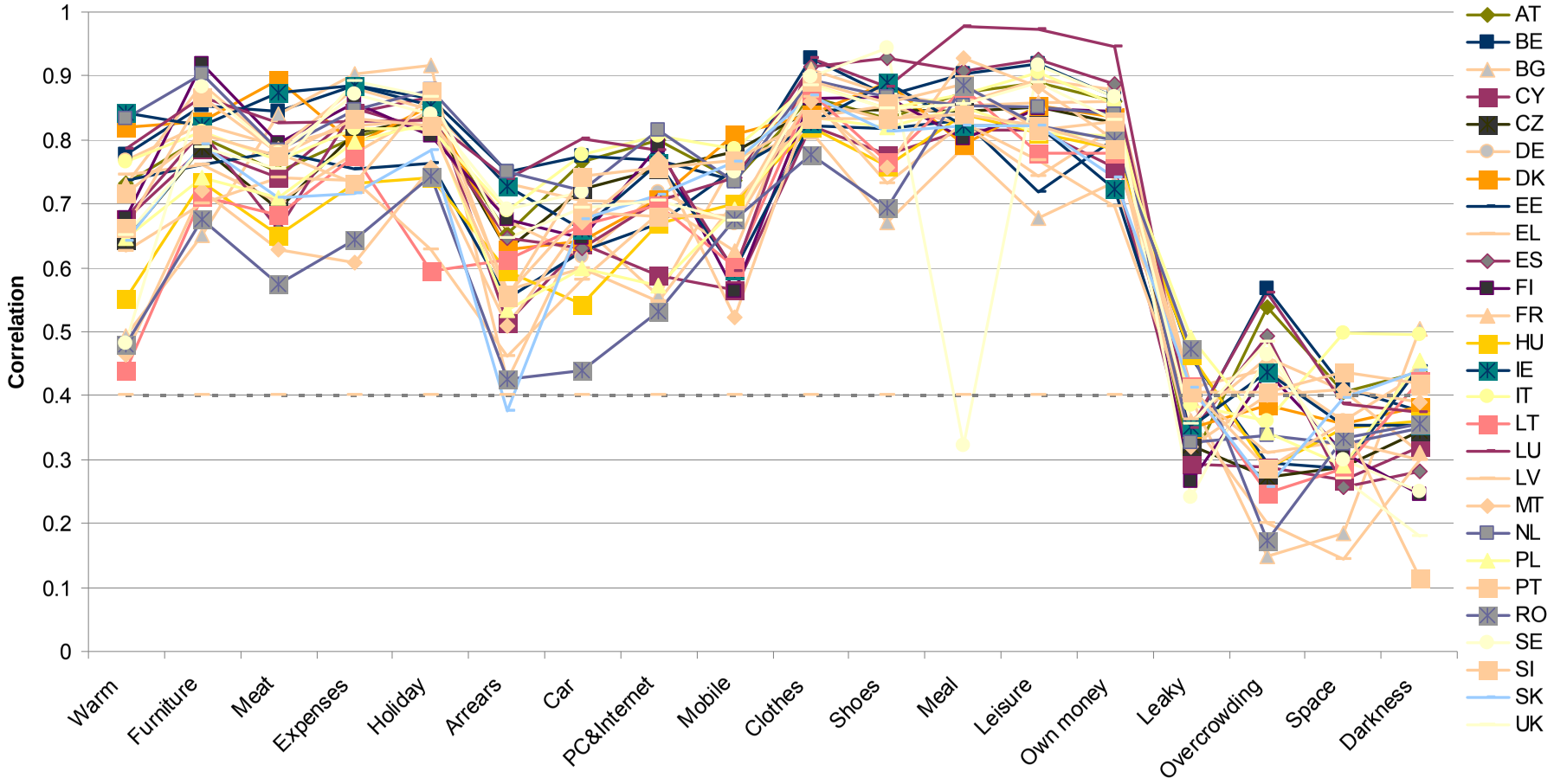


Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

9.1.5. Discrimination at the national level

Figure 10 shows that only leaking roof, overcrowding, shortage of space and dark dwelling have a correlation with the overall 'trait' below 0.4 for several countries while the vast majority of all other items have a correlation of above 0.4 (our criterion value). The only exception to this is the item 'unable to afford a meal or drink with friends or family once a month' for Sweden, which has a correlation of below 0.4. As previously mentioned, due to the large proportion of missing cases for all module items in Sweden, this result has to be interpreted cautiously.

Figure 10: Correlation between items and MD by country for the 18 items retained for the whole population MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009



Notes: The purpose of this diagram is to show the great similarity across countries rather than allow distinguishing the different Member States.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 8: Summary of IRT results for the 18 items retained for the whole population MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009

	EU LEVEL		Number of Member States (excluding Sweden)		VERDICT
	Severity	Discrimination	Severity	Discrimin.	
Keep home adequately warm			2	0	OK
Replace worn-out furniture			0	0	OK
Meat, chicken, fish or veg.			1	0	OK
Unexpected financial expenses			0	0	OK
One week annual holiday			0	0	OK
Avoiding arrears			0	1	OK
A personal car			2	0	OK
Computer & Internet			3	0	OK
A mobile phone			8	0	Suspect
Some new clothes			0	0	OK
Two pairs of shoes			0	0	OK
Drink/meal monthly			0	0	OK
Leisure activities			0	0	OK
Pocket money			0	0	OK
Leaky roof, damp, etc.		Over	8	16	Problematic
Overcrowding		Borderline	9	15	Problematic
Shortage of space		Over	9	20	Problematic
Dwelling suffers from darkness	Over	Over	23	17	Problematic

Notes: The verdict related to an item is 'Problematic' if it has severity problems in 3+ countries and discrimination problems in 3+ countries (not necessarily the same countries). It is 'Suspect' if in at least one fourth of the countries (i.e. 7 countries) it has only severity or only discrimination problems.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

To better understand the latent structure of these items at both EU and country levels, non-parametric and multidimensional models would be worth exploring in the future. Nevertheless, when combined with the other analyses, the results provide further evidence that leaking roof, overcrowding, lack of space and darkness should be excluded from the indicator related to the whole population as these show both low discrimination and too high severity scores in (many more than) two countries, which is the joint criterion we apply for rejecting an item on the basis of the IRT analysis. (This criterion is consistent with the one used in our validity test and Cronbach's alpha reliability tests.) Furthermore, the enforced lack of a mobile phone has severity problems in eight Member States, so we consider this variable to be 'suspect'. (Suspect items are those items that are problematic in at least one quarter of Member States for only one criterion (severity or discrimination)). A summary of the results and IRT 'verdict' is presented in Table 8. It shows that the 13 items that successfully passed the IRT tests for the whole population ('OK' in the column verdict) are reliable in terms of discrimination in all 27 Member States (except for one, which is reliable in 26 Member States) and reliable in terms of severity in either all the Member States (9 items), 26 Member States (1), 25 Member States (2) or 24 Member States (1).

9.2. IRT applied to children

9.2.1. Severity at EU level

Table 9 shows the two-parameter IRT results for each of the 23 retained children MD items. As explained before, the column marked 'severity' can be interpreted as the likely severity of MD suffered by a child who lacks this item because he/she cannot afford it ('enforced lack'). The table shows that children who live in households unable to repay debts from hire purchase or loans or households who cannot afford to replace worn-out furniture have the lowest MD score, while those who consider their dwelling too dark are likely to be much more deprived. If we use the same severity criterion as for the 0+ population (3 standard deviations from the mean), we see that, at EU level only, the item 'dwelling suffers from darkness' does not pass this test. This item is associated with a very high level of MD, which means that it is likely to affect only a very small number of children (those who have a MD of 3.6 standard deviations), making it unsuitable for the reliable measurement of MD in surveys with relatively small sample sizes.

Table 9: IRT results for the 23 items retained for the children MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009

	Severity	Discrimination		Correlation with MD (standardised factor loadings)
		Loading	IRT parameterisation	
Unexpected financial expenses	0.4	2.2	1.3	0.77
Replace worn-out furniture	0.6	2.3	1.3	0.78
Annual holiday (children)	0.7	2.4	1.4	0.8
Overcrowding	1.0	1.3	0.7	0.57
Leisure activity (children)	1.4	3.6	2.1	0.89
Avoiding arrears	1.5	1.5	0.9	0.65
Outdoor leisure equipment (children)	1.5	5.2	3.0	0.94
Invite friends to play and eat (children)	1.6	4.3	2.5	0.92
Shortage of space	1.6	0.8	0.5	0.42
Indoor games (children)	1.7	5.4	3.2	0.95
School trips and school event that cost money (children)	1.7	3.5	2.1	0.89
Celebrations or special occasions (children)	1.7	3.9	2.3	0.91
Some new clothes (children)	1.7	3.2	1.9	0.87
A personal car	1.7	2.2	1.3	0.77
Books at home suitable for their age (children)	1.7	4.6	2.7	0.93
Fresh fruits & vegetables once a day (children)	1.8	3.6	2.1	0.89
Meat, chicken, fish (or vegetarian equivalent) every second day (children)	1.8	3.4	2.0	0.88
Keep home adequately warm	1.85	1.9	1.1	0.72
Computer & Internet access deprivation	2.0	2.3	1.3	0.78
Two pairs of shoes (children)	2.0	3.0	1.74	0.85
Leaking roof, damp,etc.	2.1	0.8	0.5	0.41
No place to do homework (children)	2.4	1.6	0.9	0.65
Dwelling suffers from darkness	**3.6**	0.8	0.5	**0.4**

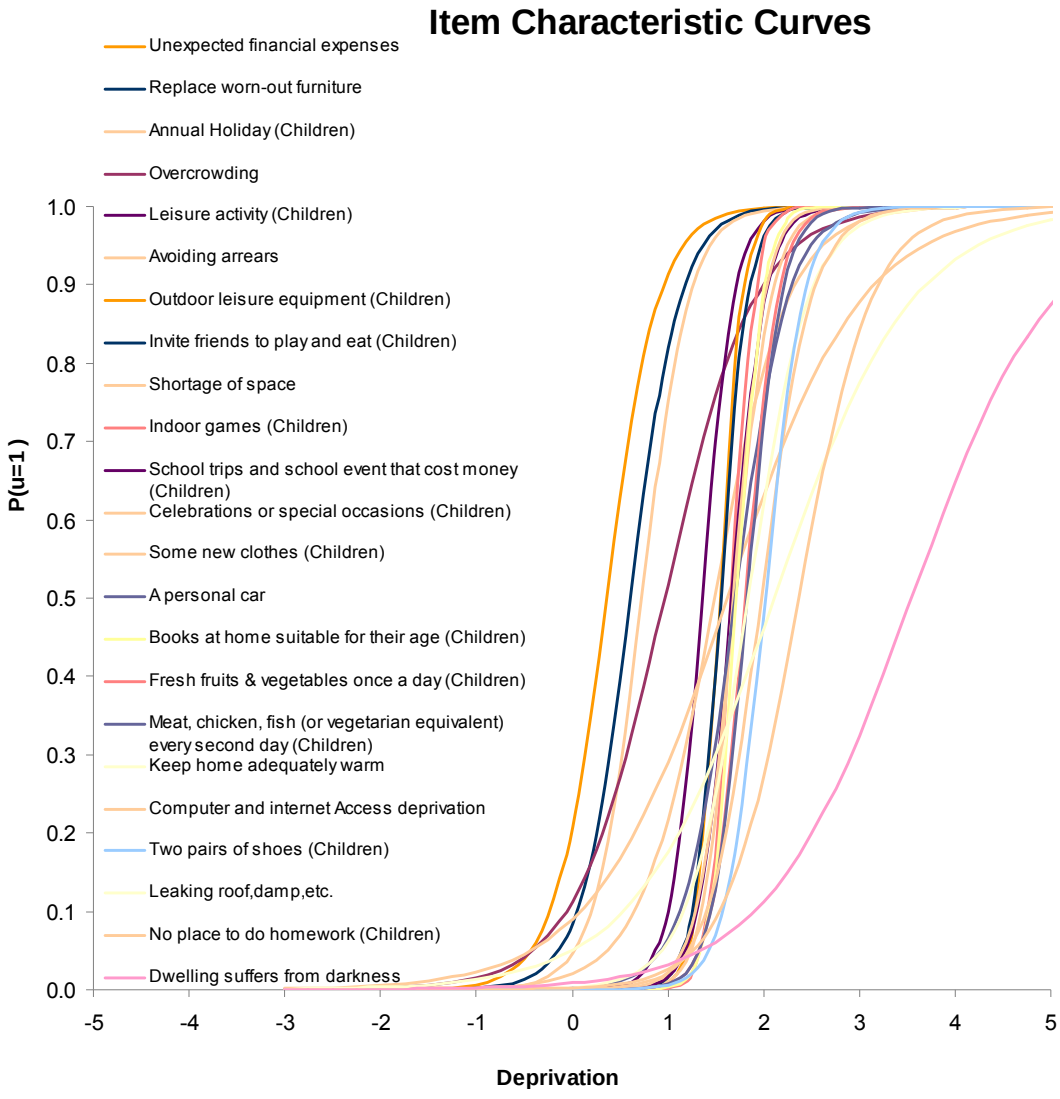
Notes: Log Likelihood is -506287. Highlighted cells are those with values above the severity threshold (3) or below the discrimination threshold (0.40).
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

9.2.2. Discrimination at EU level

The discrimination columns in Table 9 indicate how well each item discriminates between the deprived and non-deprived respondents, and can be transformed into correlation (ranging between -1 and +1) between items and MD (last column). As before, the discrimination criterion we use here is to drop all items whose correlation with MD is lower than 0.4. At EU level, Darkness, Leaky roof and Shortage of space have correlations just above this threshold (0.40, 0.41 and 0.42 respectively). Overcrowding also has a relatively low correlation when compared to the other items, but it is above 0.5.

9.2.3. 'S' shaped curve at EU level

Figure 11: IRT results for the 23 items retained for children MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009



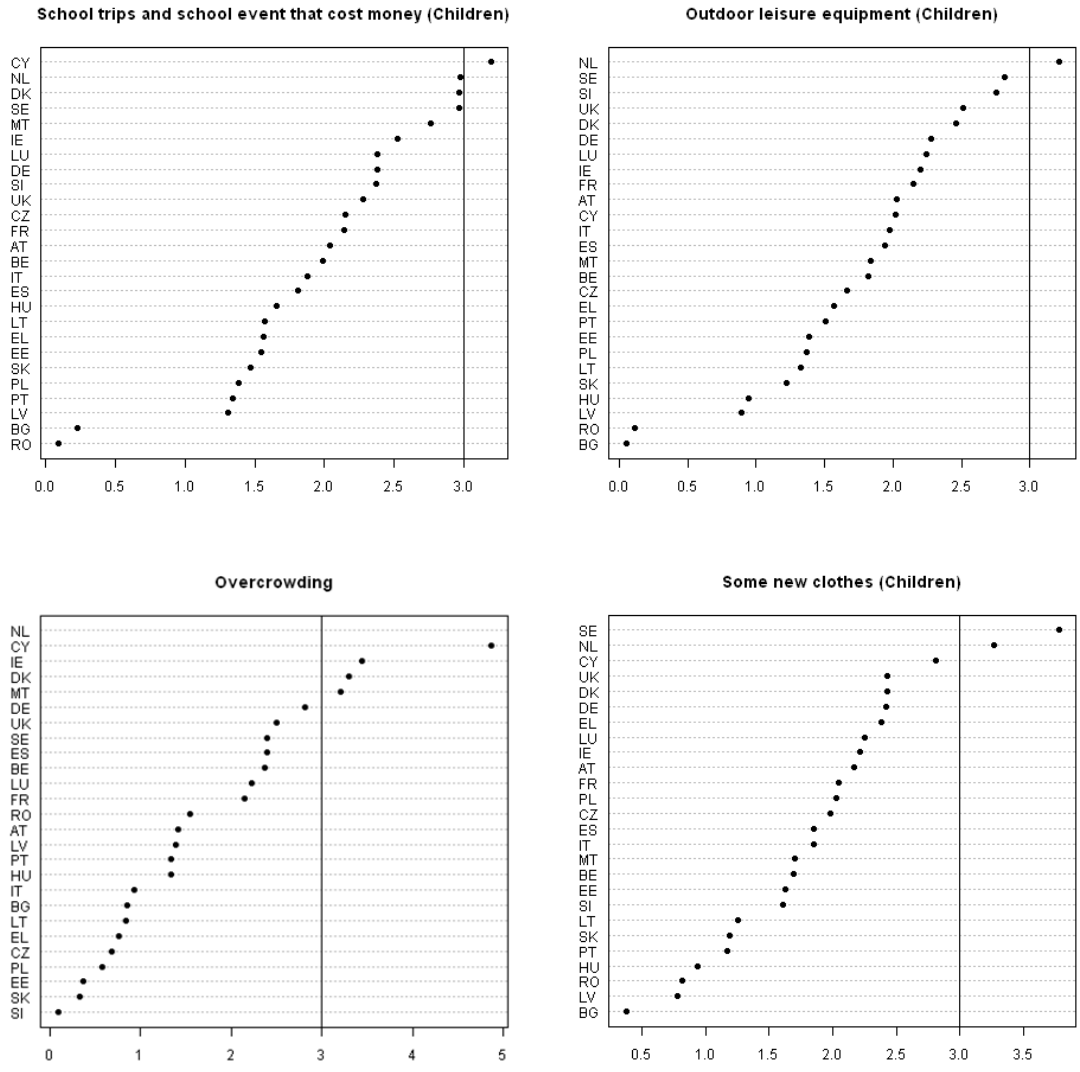
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

As explained previously, the inflection point of each curve should ideally lie between 0 and +3 on the X-axis (i.e. have severity between 0 and +3 standard deviations). Figure 11 shows that darkness conforms less to this pattern.

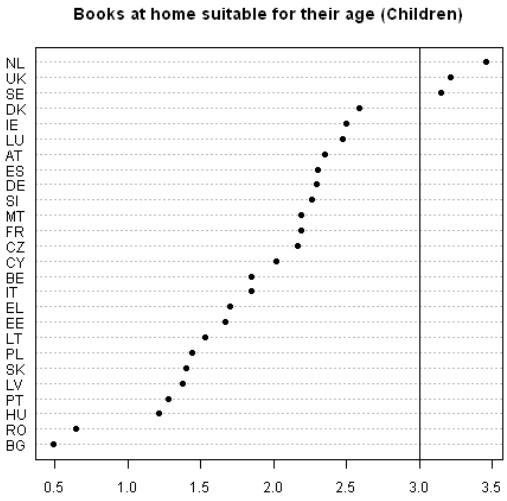
9.2.4. Severity at national level

Figure 12 presents the 16 items with one or more severity problem(s), while the remaining seven items fulfil our criterion (3 standard deviations) in all Member States. It shows that in the majority of countries those children suffering from living in a dark dwelling are above our 3 standard deviations threshold, which means that this item does not satisfactorily measure child MD among the majority of EU countries. There are only four other items that have severity problems in three or more countries (excluding Sweden): leaking roof, overcrowding, no place to do homework are associated with (extremely) high levels of MD in some EU countries. 'Meat, chicken, fish (or vegetarian equivalent) every second day' (children) is 'borderline' with severity problems in 3 countries. (The model parameters for the Finnish data are not shown because of estimation problems.)

Figure 12: Severity parameters for national models (child population)([30]), 2009



([30]) The Netherlands severity parameters for overcrowding and no place to do homework were excluded as the standard errors were unusually large.


Books at home suitable for their age (Children)
NL
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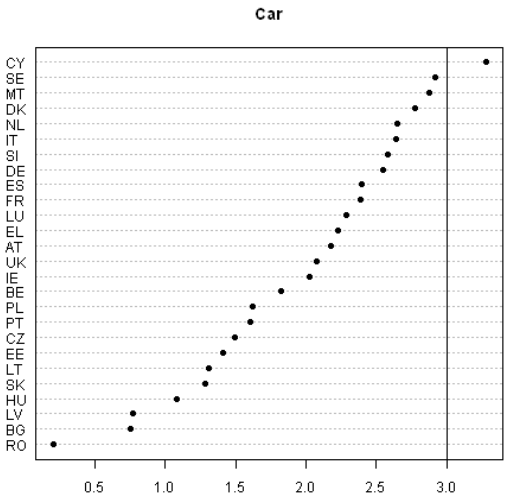
Car
CY
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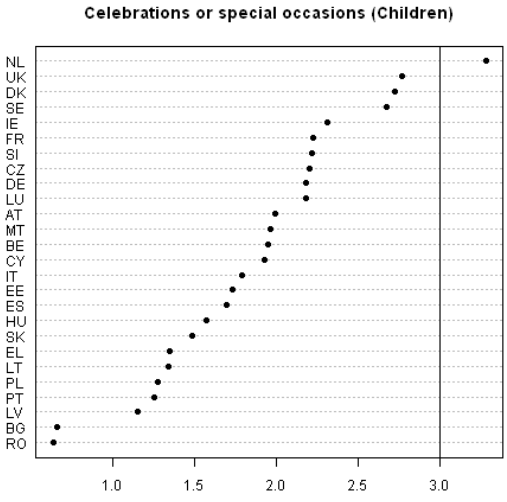
Celebrations or special occasions (Children)
NL
UK
DK
SE
IE
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CZ
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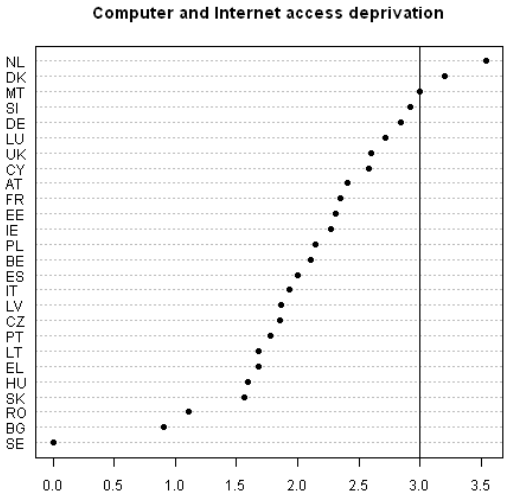
Computer and Internet access deprivation
NL
DK
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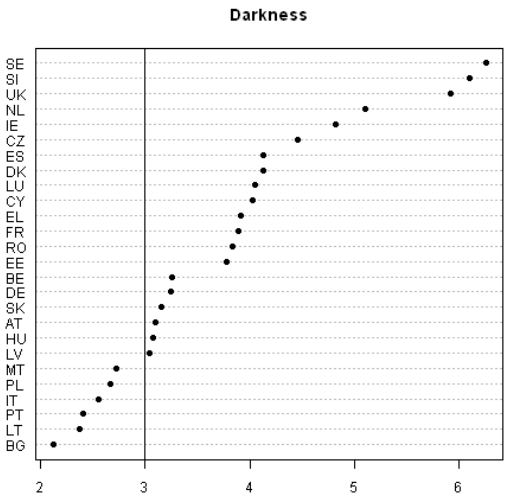
Darkness
SE
SI
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NL
IE
CZ
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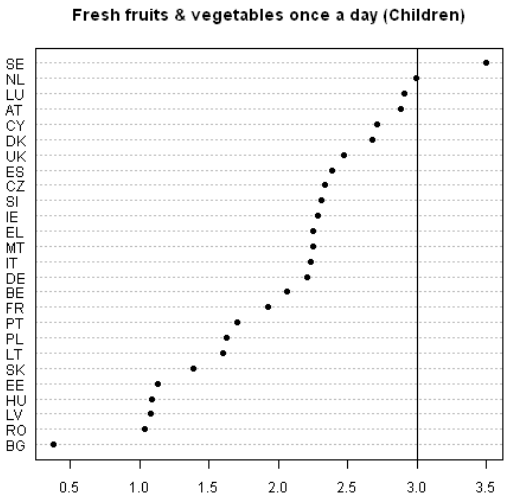
Fresh fruits & vegetables once a day (Children)
SE
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LU
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UK
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DE
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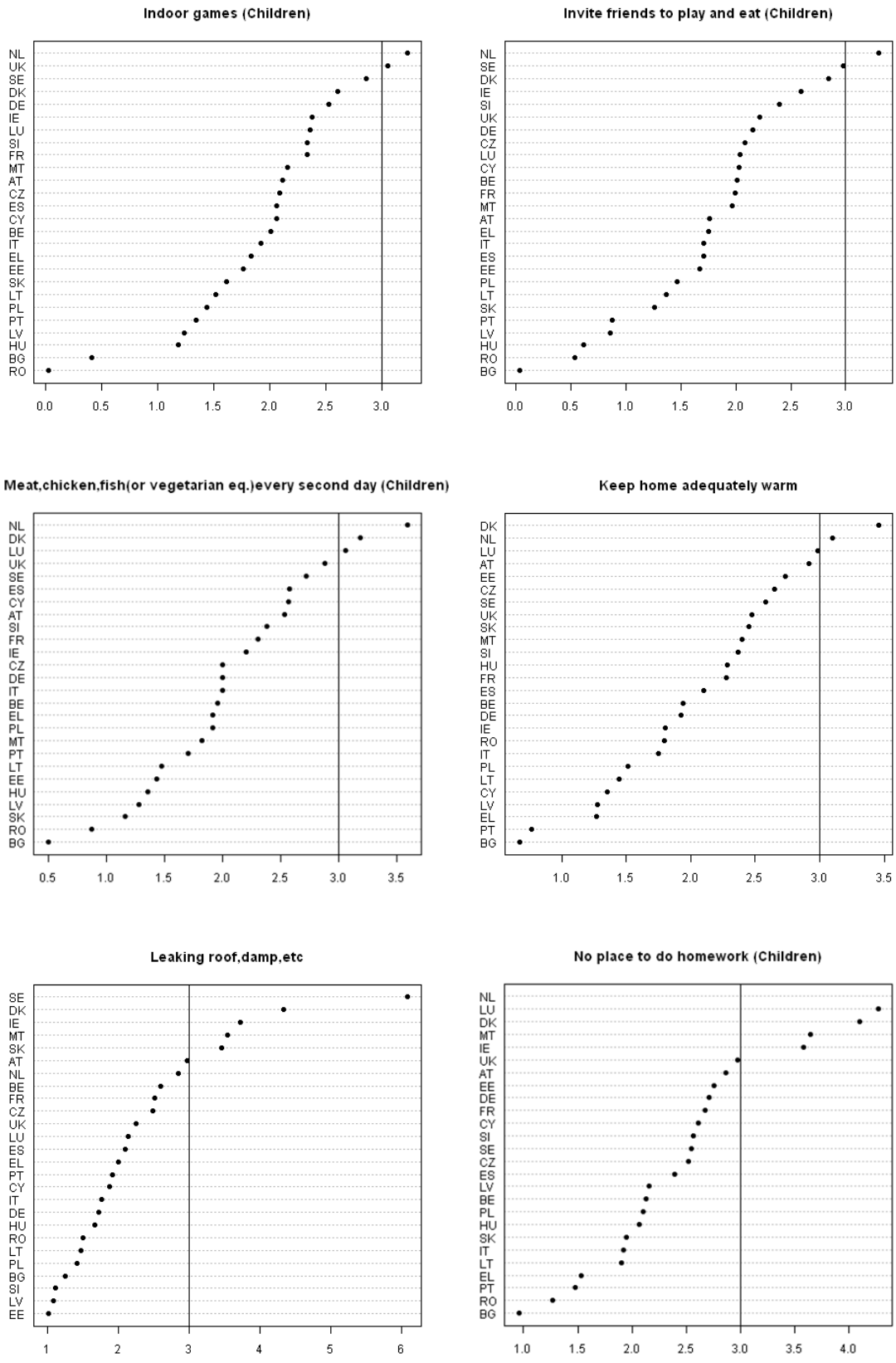
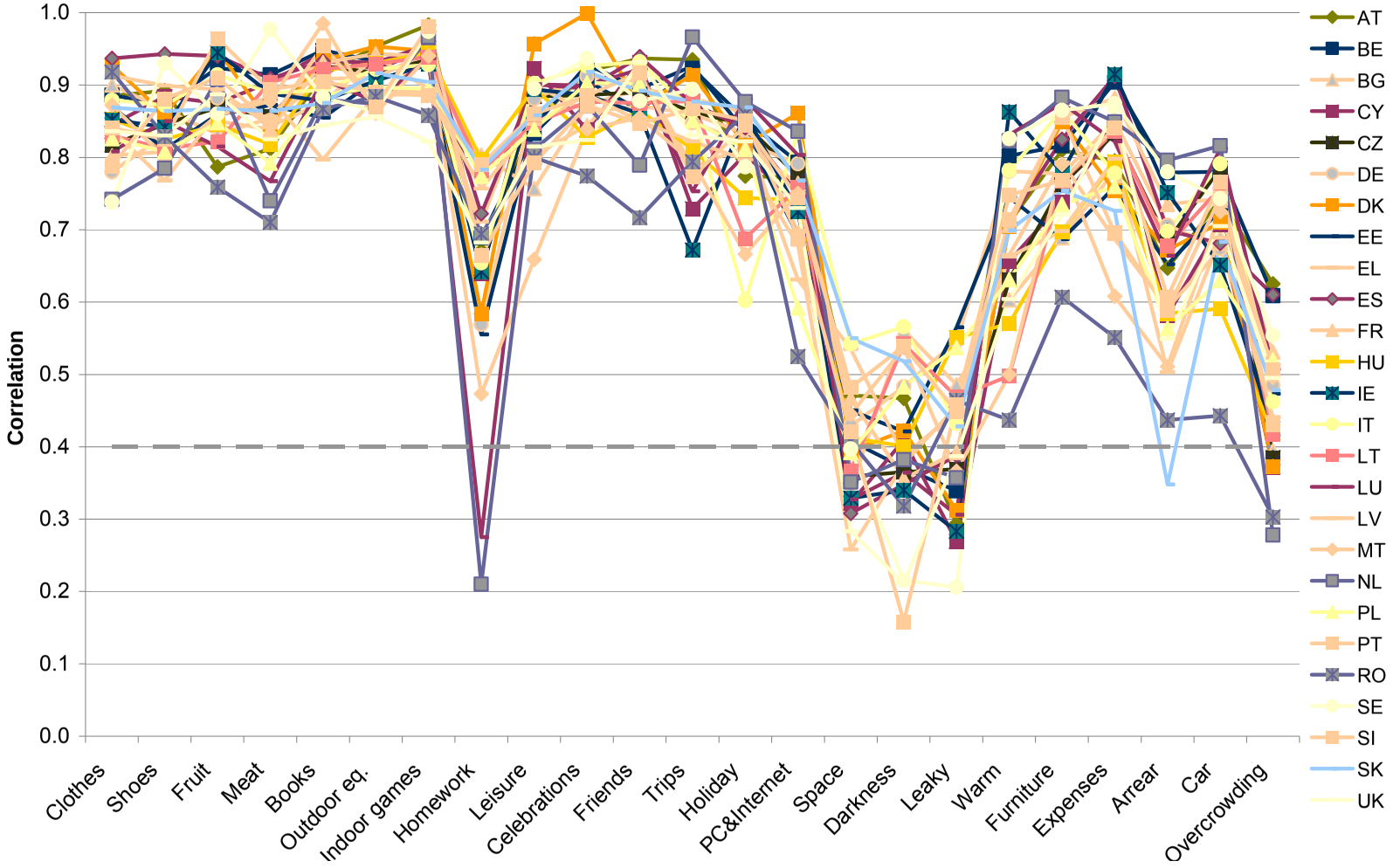


Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

9.2.5. Discrimination at the national level

Figure 13 shows that leaking roof, overcrowding, shortage of space and dark dwelling have a correlation with the overall 'trait' below 0.4 for a large number of countries while the vast majority of all other items have a correlation of above 0.4.

Figure 13: Correlation between items and children MD by country for the 23 items retained after the validity and reliability (Cronbach's alpha) tests, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 10: Summary of IRT results for the 23 items retained for children MD indicator after the validity and reliability (Cronbach's alpha) tests, 2009

	EU LEVEL		Number of Member States (excluding Sweden)		VERDICT
	Severity	Discrimin.	Severity	Discrimin.	
Some new clothes (children)			1	0	OK
Two pairs of shoes (children)			0	0	OK
Fresh fruits & vegetables (children)			0	0	OK
Meat, chicken... (children)			3	0	OK
Books at home (children)			2	0	OK
Outdoor leisure equipment (children)			1	0	OK
Indoor games (children)			2	0	OK
No place to do homework (children)			4	2	Borderline
Leisure activity (children)			0	0	OK
Celebrations (children)			1	0	OK
Invite friends to play and eat (children)			1	0	OK
School trips (children)			1	0	OK
Annual Holiday (children)			0	0	OK
Computer & Internet			2	0	OK
Shortage of space		Borderline	0	12	Suspect
Dwelling suffers from darkness	Over	Borderline	18	12	Problematic
Leaking roof, damp, etc.			4	12	Problematic
Keep home adequately warm			2	0	OK
Replace worn-out furniture			0	0	OK
Unexpected financial expenses			0	0	OK
Avoiding arrears			0	1	OK
A personal car			1	0	OK
Overcrowding			4	6	Problematic

Notes: The verdict related to an item is 'Problematic' if it has severity problems in 3+ countries and discrimination problems in 3+ countries (not necessarily the same countries). It is 'Suspect' if in at least one fourth of the countries (i.e. 7 countries) it has only severity or only discrimination problems.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table 10 summarises the IRT analysis for children. Although further IRT analysis would be useful, when combined with the other analyses the results provide further evidence that leaking roof and darkness should be excluded from the MD indicator for children, as these have both very high severity and low discrimination in many countries. Overcrowding, which was borderline on the Cronbach's alpha test, does not pass the IRT analysis tests: it has low discrimination and very high severity in more than two countries. Furthermore, Shortage of space is suspect, with discrimination problems in 12 countries. A Suitable place to do homework is borderline with problems of severity in four countries and of discrimination in two countries. The summary presented in Table 10 shows that the 19 items that successfully pass the IRT tests for the child population ('OK' in the column verdict or, in the case of No place to do homework, 'borderline') are reliable in terms of discrimination for all 27 Member States (except for two: Avoiding arrears (which is reliable in 26 Member States) and No place to do homework (25 Member States)) and reliable in terms of severity in either all the Member States (7 items), 26 Member States (6), 25 Member States (4), 24 Member States (1) or 23 Member States (1).

10. Results of the suitability, validity, CTT reliability and IRT reliability tests

10.1. Whole population

Table 11 summarises the various tests performed so far on the data (see Sections 5-7). It flags the items for which there is a problem in more than two countries with suitability (Section 5.), validity (Section 6) or reliability (either CTT [Section 7.1] or IRT [Section 8.1]).

The *mobile phone* item is 'borderline' according the IRT analysis and was dropped from the final list as its inclusion may raise doubts about the consistency over time of the scale. Indeed, as mobile phone penetration/saturation rates are increasing very rapidly, it is unlikely to be a reliable MD indicator in most EU countries in the near future.

All the items for which one or more of these robustness criteria are not met have been dropped from the lists of items retained for our proposed 0+ indicator.

Table 11: Summary of suitability, validity and reliability tests, whole population, 2009

At least half of the adults living in the household cannot afford (but would like to have):	Problems of:
A mobile phone (M)	√ (Borderline IRT)
Some new clothes (M)	√
Two pairs of shoes (M)	√
Some money for oneself (M)	√
Drink/meal monthly (M)	√
Leisure activities (M)	√ (Suitability)
The household's dwelling suffers from:	
Basic amenities	Reliability
Shortage of space	Reliability
Darkness	Reliability
Leaky roof, damp, etc.	Reliability
Litter lying around (M)	Reliability
Vandalism (M)	Reliability
Noise	Reliability
Pollution	Reliability
Crime	Reliability
Overcrowding	Reliability
High housing costs (>40 % income)	Reliability
The household cannot afford:	
To replace worn-out furniture	√
A meal with meat, chicken or fish	√
To face unexpected expenses	√
To keep home adequately warm	√
One week annual holiday away from home	√
To avoid arrears	√
A washing machine (enforced lack)	Reliability
A colour TV (enforced lack)	Validity & Reliability
A telephone (enforced lack)	Validity & Reliability
A computer/Internet (enforced lack)	√
A personal car (enforced lack)	√
The household has a (very) difficult access to:	
Public transport (M)	Reliability
Postal/banking services (M)	Reliability

Note 1: M: MODULE. √=successful on all 4 criteria.

Note 2: We consider that an item has validity problems if the results of the logistic regressions are not significant in two out of the three validity tests. And we consider an item 'invalid' if it has validity problems in more than 2 out of 27 Member States. Due to the huge proportion of missing cases for all module items in Sweden (around 40 %), this country is not taken into account in the count. For reliability tests, the same logic is followed. The reliability tests are considered successful if reliability problems are observed for maximum 2 Member States. An item is kept in the proposed indicator if it does not violate any of the 4 criteria we have retained in our analytical framework (suitability, validity, reliability (CTT) and reliability (IRT)).

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

10.2. Children

Table 12 summarises the various tests performed on the data (see Sections 5-7). It flags the items for which there is a problem in more than two countries with suitability (Section 5.), validity (Section 6) or reliability (either CTT [Section 7.2] or IRT [Section 8.2]).

Table 12: Outcomes of suitability, validity and reliability tests, child population, 2009

The household cannot afford for at least one child (but would like to be able to afford):	Problems
Some new clothes (M)	√
Two pairs of shoes (M)	√
Fresh fruits & vegetables daily (M)	√
Three meals a day (M)	Validity & Reliability
Meat, chicken, fish daily (M)	√
Suitable books (M)	√
Outdoor leisure equipment (M)	√
Indoor games (M)	√
Place to do homework (M)	√ (Borderline IRT)
To consult a dentist (M - optional)	Validity & Reliability
To consult a GP (M - optional)	Validity & Reliability
Leisure activities (M)	√ (Suitability)
Celebrations (M)	√
To invite friends (M)	√
School trips (M)	√
Outdoor space to play (M)	Reliability
Holiday (M - optional)	√
The household's dwelling suffers from:	
Basic amenities	Validity & Reliability
Shortage of space	Reliability
Darkness	Reliability
Noise	Validity & Reliability
Pollution	Validity & Reliability
Crime	Validity & Reliability
Leaky roof, damp, etc.	Reliability
Inadequate warmth in home	√
High housing costs (>40 % income)	Reliability
Overcrowding	Reliability
Litter lying around(M)	Validity & Reliability
Vandalism (M)	Reliability

Table 12 (continued):

The household cannot afford:	Problems
To replace worn-out furniture	√
To face unexpected expenses	√
To avoid arrears	√
A telephone (enforced lack)	Validity & Reliability
A colour TV (enforced lack)	Validity & Reliability
A computer and Internet (enforced lack)	√
A washing machine (enforced lack)	Validity & Reliability
A car (enforced lack)	√
A meal with meat, fish…	Redundant
One week annual holiday	Redundant. This item was used only in those countries that did not collect children holidays
The household has a (very) difficult access to:	
Public transport (M)	Validity & Reliability
Postal/banking services (M)	Validity & Reliability

Note 1: M: MODULE. √=successful on all 4 criteria.

Note 2: We consider that an item has validity problems if the results of the logistic regressions are not significant in both validity tests. And we consider an item 'invalid' if it has validity problems in more than 2 out of 27 Member States. Due to the huge proportion of missing cases for all module items in Sweden (around 40 %), this country is not taken into account in the count. For reliability tests, the same logic is followed. The reliability tests are considered successful if reliability problems are observed for maximum 2 Member States. An item is kept in the proposed indicator if it does not violate any of the 4 criteria we have retained in our analytical framework (suitability, validity, reliability (CTT) and reliability (IRT)).

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

In view of the holistic concept of child deprivation we have adopted (see Section 2.3), the child indicator we propose includes all household MD items that successfully passed the various tests (including the additivity test which we discuss below, in Section 11) and that are most likely to affect children's well-being. Household deprivation items for which there are similar child specific items (i.e. lack of holidays and lack of meal with meat, fish...) have been excluded in order to avoid duplication. Concerning the lack of holidays, even though our analysis shows that both items capture different aspects, we have opted to use only the children's item as it offers a more direct assessment of children's living conditions. As already mentioned, in the specific case of the lack of holidays the child holiday question was optional and we have therefore used the household 'holiday item' as a proxy in the nine Member States that did not collect this child deprivation item. In view of the importance of this item, it is crucial to collect this information for children in *all* Member States in future data collection.

11. Additivity of the pre-final list of MD items

Additivity tests aim to ensure that the MD indicator's components add up, i.e. to check that, say, someone with a MD indicator score of '2' is in reality suffering from more severe MD than someone with a score of '1' or a score of '0'. This was checked using an ANOVA model (second order interactions of MD items by level of equivalised disposable household income). Negative incomes were adjusted according to the methodology proposed by Verma (2007). These models assume that people who suffer from two deprivations (e.g. those who cannot afford both clothes and shoes) should live in households with (on average) significantly lower net equivalised incomes than those who only suffer from one deprivation (clothes or shoes deprivation only) or no deprivations. Similarly, those people suffering from one deprivation should have lower incomes than those with no deprivations. This should hold for all possible combinations of deprivation items.

These additivity tests can show that in the EU as a whole or in any of the 27 EU Member States, on average, those with a higher deprivation score are 'poorer' that those with a lower deprivation score. However, these analyses do not prove that this is also true for all sub-groups living in a Member State. For example, it may be that due to discrimination in some Member States 'deprived' members of certain minority groups (e.g. Roma, Indigenous peoples, etc.) suffer from greater deprivation of service access than the majority population with similar levels of deprivation. Differential Item Functioning (DIF) is a set of statistical techniques which can test for sub-group differences in response to deprivation questions. DIF analyses are both time consuming and complex, and would fall outside the scope of this paper.

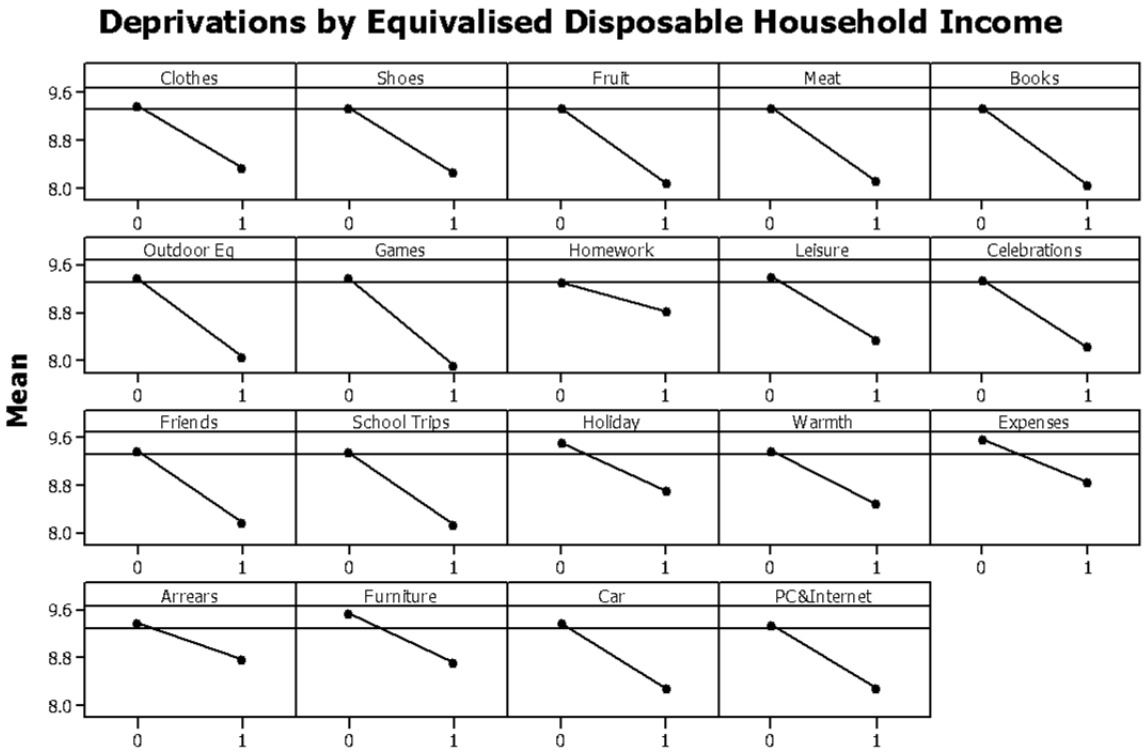
It should be noted that, with the validity and reliability tests, we applied a 3+ Member State rule, which was suitable for these tests because a lower sample size makes these tests more conservative. That is, the lower sample size in each country (compared with the EU as a whole) means that the validity tests, the Cronbach's alphas, and the IRT results are less likely to be passed. With the interaction additivity tests, the lower the sample size the more likely the test is to be passed. So, with the additivity tests, the smaller the sample size the ***more*** likely the Member State is to pass these tests - i.e., the direction of the additivity tests is the reverse of the direction of the validity and reliability tests. In order to be consistent and err on the side of caution, we therefore need to take the worst case scenario for each test, i.e. EU level for additivity and Member State level for validity and reliability. So, we have performed our additivity tests first at EU level (pooled EU-27 dataset) and then also for each individual Member State separately.

The result of our tests on both the populations aged 0+ and 1-15 is that only one additional item needs to be rejected: the ability to pay 'unexpected expenses'. This (household) item passes the additivity tests for the whole population but fails for the child population. Therefore, this section starts with the additivity results for the child population (Section 11.1) and then presents the results for the whole population (Section 11.2).

11.1. Additivity tests for the child population

Figure 14 shows (for the pooled EU-27 dataset) the main effect plot of the 19 MD items tested for inclusion in the child index. The Y-axis shows the log of equivalised household disposable income; the left hand dot on each graph shows the estimated average incomes of those not suffering for a deprivation and the right hand dot the estimate average incomes of those suffering from a deprivation. Figure 14 clearly shows that, for all 19 items, those children suffering from deprivation live in households with (on average) much lower household incomes. The horizontal line in each graph shows the average incomes of households with children.

Figure 14: ANOVA main effect plot of MD items by income, EU-27, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

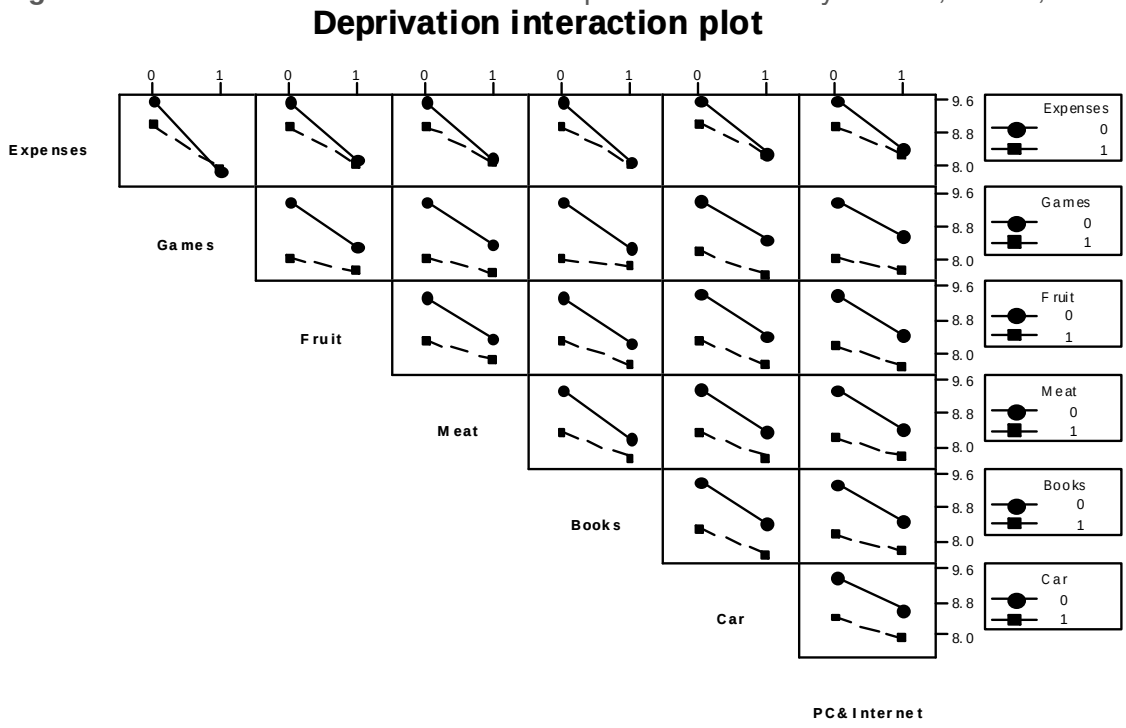
Figure 15 shows (for the pooled EU-27 dataset) the second order interaction effects for seven of the 19 child MD items shown in Figure 14 (above). The last graph (bottom right) shows the interaction effects of Car by PC & Internet – two lines can be seen sloping from top left to bottom right, which indicates that:

- households which have no deprivations are estimated to have the highest income;
- households suffering from two deprivations (lack of a car and PC/Internet) are estimated to have the lowest incomes; and
- households suffering from one deprivation (either lacking a car or PC/Internet) are estimated to have intermediate levels of income.

Thus, we can conclude that the MD items Car and PC/Internet are likely to be additive.

Interaction graphs can sometimes be difficult to interpret, where we see two parallel lines sloping from top left to bottom right (as discussed above) which indicates that there are no additivity problems. However, if these two lines intersect or cross (e.g. the top row of graphs in Figure 15), this indicates that there may be additivity problems.

Figure 15: ANOVA second order interaction plot of MD items by income, EU-27, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 15 shows that the two lines in the top left graph (Expenses by Games) intersect indicating that there may be additivity problems for these two MD items. This figure indicates that expenses may have additivity problems at EU level with all the other items shown in this interaction plot.

To further test the additivity of the MD items, all possible two-way interactions of the log of equivalised disposable household income were calculated for all the MD items that were previously found to be suitable, reliable and valid (see Tables 11 and 12 above). The actual means were used rather than the estimated means from an ANOVA model, due to the computational complexity of calculating such large models.

For the 19 retained valid, suitable and reliable child MD items, 4,788 Two By Two tables with 23,940 interactions were calculated (the difference in the mean income of all possible MD index scores of 0, 1 and 2) - i.e., all two way interactions for the 19 items by 27 EU Member States and the EU as a whole. For the EU as a whole, there were interaction problems for 'Expenses' with six other MD items (Fruit, Meat, Books, Indoor Games, PC/Internet and Car) – this confirms the interaction plot results shown in Figure 15. Figure 16 further illustrates the interaction problem of Expenses with Fruit. It is clear that households which report that their children suffer from an enforced lack of fruit and also cannot afford to pay unexpected expenses have a higher average income than households where children are only 'fruit' deprived (see the two error bars on the right of Figure 16).

Figure 16: Error bar plot of log of income by Expenses by Fruit deprivation, EU-27, 2009

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

For the 27 EU Member States, only 19 statistically significant (but still fairly minor) interaction problems were detected. Of these 19 'problems', 14 were probably due to there being too few cases in some categories to accurately calculate 95 % Confidence Intervals of the mean household income and/or the presence of an 'outlier' in one of the categories. The 5 remaining interaction problems were:

- Bulgaria: Leisure by Books
- Germany: Homework by Outdoor Equipment
- Ireland: Friends by Arrears
- UK: Friends by Outdoor Equipment
- UK: Car by Shoes

Given the additivity problem of 'expenses' with six child MD items at EU level, we decided to drop this item from the final child MD indicator.

11.2. Additivity tests for the whole population (0+)

For the 13 whole population (0+) valid, suitable and reliable MD items, 2,184 Two by Two tables with 10,920 interactions (i.e. the difference in the mean income of all possible deprivation index scores of 0, 1 and 2) were calculated. There were only seven statistically significant (but still fairly minor) interaction problems. Five of these problems were with the 'Meat' MD item in Denmark, one was Car by PC/Internet in Denmark and the final 'problem' was the interaction of Expenses and Arrears in Cyprus. No 0+ MD item were dropped on the basis of these fairly minor interaction problems. The interaction problems for the 'Meat' item in Denmark may be related to the fact that according to the UN Food and Agriculture Organisation the people of Denmark eat more meat *per capita* than any other nation in the world.

12. Final lists of MD items (and related aggregate indicators) after their tests against the methodological principles to be met by EU social indicators

12.1. Tests of suitable, valid, reliable and additive items against the EU methodological framework for the development of social indicators

Now that we have identified those MD items that are suitable, valid, reliable and additive, we need to test the two selected lists of items (and related aggregate indicators) against the methodological principles imposed by the EU framework for the development of EU social protection and social inclusion indicators. For indicators to be fit for purpose, i.e. in this case to ensure that they will provide robust tools for assessing and monitoring MD not only at EU level but also at individual Member State's level, their construction needs to follow a principle-based approach. The '*Report on indicators in the field of poverty and social exclusion*' (Social Protection Committee, 2001), prepared by the Indicators Sub-Group of the Social Protection Committee (SPC) and adopted in 2001 by EU Heads of State and Government, set out methodological principles for the construction of the commonly agreed social inclusion indicators on top of proposing the first commonly agreed EU indicators for social inclusion (the so-called *Laeken indicators*)[31]. Since then, the approach used for the adoption at EU level of both social inclusion and social protection indicators (European Commission, 2009) is very close to the one endorsed in 2001. The EU MD indicators proposed here for the 0+ and 1-15 populations therefore also need to **satisfactorily fulfil the following methodological criteria:**

- they should be robust and statistically validated;
- they should capture the essence of the problem and have a clear and accepted normative interpretation;
- they should provide a sufficient level of cross countries comparability, as far as practicable with the use of internationally applied definitions and data collection standards;
- they should be built on available underlying data, and be timely and susceptible to revision; and
- they should be responsive to policy interventions but not subject to manipulation.

In view of the careful and systematic analytical framework we have followed for identifying the items to be included in our proposed MD indicators, we are confident that these items (and related aggregate indicators) are robust and statistically validated, and that they capture the essence of the problem.

In our view, the need for 'a clear and accepted normative interpretation', i.e. the fact that the adoption of an indicator for policy purposes should mean that there is agreement across EU Member States as to which direction represents an improvement, is met by all items except arguably the enforced lack of a car. Indeed, we believe that it is not the enforced lack of a car as such that is the critical issue that the European Commission and EU Member States need to

[31] The methodological principles adopted in Laeken were consistent with those put forward in a 2001 study by Atkinson *et al* carried out on behalf of the EU Belgian Presidency, where they were originally proposed. Readers interested in a detailed discussion of these principles and, more broadly, of comparative EU indicators for social inclusion can refer Atkinson *et al* (2002).

assess/ monitor, but rather whether or not the mobility possibilities available to people are both affordable and meet their needs.

We think that this important dimension of living conditions needs to be better addressed in EU-SILC and the variable 'Difficulty with accessing local public transport' included in the 2009 EU-SILC MD module was a useful step in this direction. However, as previously discussed this public transport item should not be included in the MD indicators as it belongs to a separate dimension (see Section 4) and it did not pass our validity and reliability tests. It would require the development of a specific EU indicator (separate from the MD indicators) and more detailed information is required than is available from the 2009 MD module. In our opinion, this indicator should be about access to affordable and satisfactory mobility in comfortable and safe conditions; it should take account of all public/ private transportation means available to the household. An example of survey question that might help capture the complexity of the issue would be:

'Does your household have a car?

- *Yes*
- *No, but this is fine: myself and the other members of my household can cope satisfactorily with the daily/regular travelling we have to do (e.g. public transport is appropriate, the travelling we have to do is short and does not require a car [we can walk, cycle, etc...], when we need a car we have access to one [from a neighbour, a family member, through an appropriate car sharing system...])*
- *No, and this causes problems of mobility to my household - we would need a car but cannot have one because it is too expensive*
- *No, and this causes problems of mobility to my household - we would need a car but cannot have one for other reasons than affordability (no driving license, health problems, too young/old...).'*

Other considerations may also argue in favour of not keeping 'enforced lack of a car' in our final lists of MD items, namely the fact that including it is arguably not consistent with the climate change and energy targets agreed upon in June 2010 at EU level (in the context of the Europe 2020 Strategy) – '*greenhouse gas emissions 20 % (or even 30 %, if the conditions are right) lower than 1990*' by 2020. So, except possibly for the enforced lack of a car (for which the 'normativity' criterion may be an issue), criteria a) and b) are satisfactorily met for all the (suitable, valid, reliable and additive) selected items and related aggregate indicators.

The various tests carried out not only on EU-SILC data but also on Eurobarometer data lead us to conclude that all the selected items provide a good level of international comparability, which addresses criterion c). The fact that EU indicators should be built on available underlying data and be timely and susceptible to revision is obviously beyond our control. However, in view of the Europe 2020 social inclusion target (and thus in view of the importance of measuring accurately MD, which is one the three components of the target; see above), we believe that this criterion will be addressed as required. On timeliness, it is important to recall that an important strength of MD indicators is that they are based on information relating to the year of the survey rather than, as is the case for poverty risk rates in all EU countries (except for IE and UK), on information relating to the year prior to the survey. So, we are confident that criterion d) will also be met. Finally, with regard to criterion (e), the selected items (and related aggregate indicators) are expected to be responsive to policy interventions. Furthermore, in view of the analytical framework we have applied for their construction, we trust that they will not easily be subject to manipulation.

To conclude, with the exception of 'enforced lack of a car' for which there may be a normativity issue, we believe that all the suitable, valid, reliable and additive items identified above satisfactorily meet all five methodological principles. With regard to 'enforced lack of a car', given that this item is suitable, valid, reliable and additive, at this stage we have kept it in both the list related to the whole population and the list related to the child population.

12.2. Final lists of items

12.2.1. Final list for the whole population (0+)

The final list of items retained for the MD indicator related to the whole population (0+) consists therefore of the following 5 'adult' and 8 'household' items:

1. Adult: Some new clothes (enforced lack) – NEW
2. Adult: Two pairs of shoes (enforced lack) – NEW
3. Adult: Some money for oneself (enforced lack) – NEW
4. Adult: Leisure activities (enforced lack) – NEW
5. Adult: Drink/meal monthly (enforced lack) – NEW
6. Household: Replace worn-out furniture (enforced lack) – NEW
7. Household: Meat, chicken, fish (or vegetarian equivalent) *****
8. Household: Unexpected expenses *****
9. Household: Holiday *****
10. Household: Arrears *****
11. Household: Computer & Internet (enforced lack) – NEW
12. Household: Home adequately warm *****
13. Household: Car (enforced lack) *****

Among the nine items used in the current EU MD indicator, six are retained (items with an asterisk are included in the current EU MD indicator). The enforced lack of a washing machine, a TV, and a telephone failed in our tests and have no impact on the proportion of people deprived in most EU Member States (Nolan and Whelan, 2011, pp. 83-86). The seven 'NEW' items are from the 2009 MD module and are not currently included in the core questionnaire of EU-SILC.

12.2.2. Final list for the child population

The final list of items retained in the MD indicator related to the children (1-15) population consists therefore of the following 13 'children' and 5 'household' items:

1. Child: Some new clothes (enforced lack) - NEW
2. Child: Two pairs of shoes (enforced lack) - NEW
3. Child: Fresh fruits & vegetables daily (enforced lack) - NEW
4. Child: Meat, chicken, fish daily (enforced lack) - NEW
5. Child: Suitable books (enforced lack) - NEW
6. Child: Outdoor leisure equipment (enforced lack) - NEW
7. Child: Indoor games (enforced lack) - NEW
8. Child: Place to do homework - NEW
9. Child: Leisure activities (enforced lack) - NEW
10. Child: Celebrations (enforced lack) - NEW
11. Child: Invite friends (enforced lack) - NEW
12. Child: School trips (enforced lack) - NEW
13. Child: Holiday (enforced lack) - NEW
14. Household: Replace worn-out furniture (enforced lack) - NEW
15. Household: Arrears
16. Household: Computer & Internet (enforced lack) – NEW
17. Household: Home adequately warm
18. Household: Car (enforced lack)

13. Aggregation

13.1. Whole population

13.1.1. Reliability of the proposed scale

The Cronbach's alpha for the 13-item whole population (aged 0+) deprivation indicator is 0.85 for the pooled EU-27 dataset. The national Alphas range from 0.75 in Sweden to 0.86 in Belgium (see Figure 17). Thus, our proposed whole population deprivation indicator has a high reliability for the EU-27 as a whole and also for each of the 27 EU Member States. In each country, the reliability clearly exceeds the 0.70 acceptability threshold (Nunally, 1978). This is a major improvement on the current (9-item) indicator for which the Alpha varies from 0.50-0.60 in LU, CY, SE, UK, DK, NL to 0.70 in BG (0.69 for the EU as a whole).

To summarise, the current 9-item Material Deprivation indicator has a low reliability in almost all EU Member States and also for the pooled EU-27 data. By contrast, our proposed 13-item MD indicator is highly reliable for the EU as a whole and in all EU countries and, therefore, measures deprivation with much greater precision than the current MD indicator.

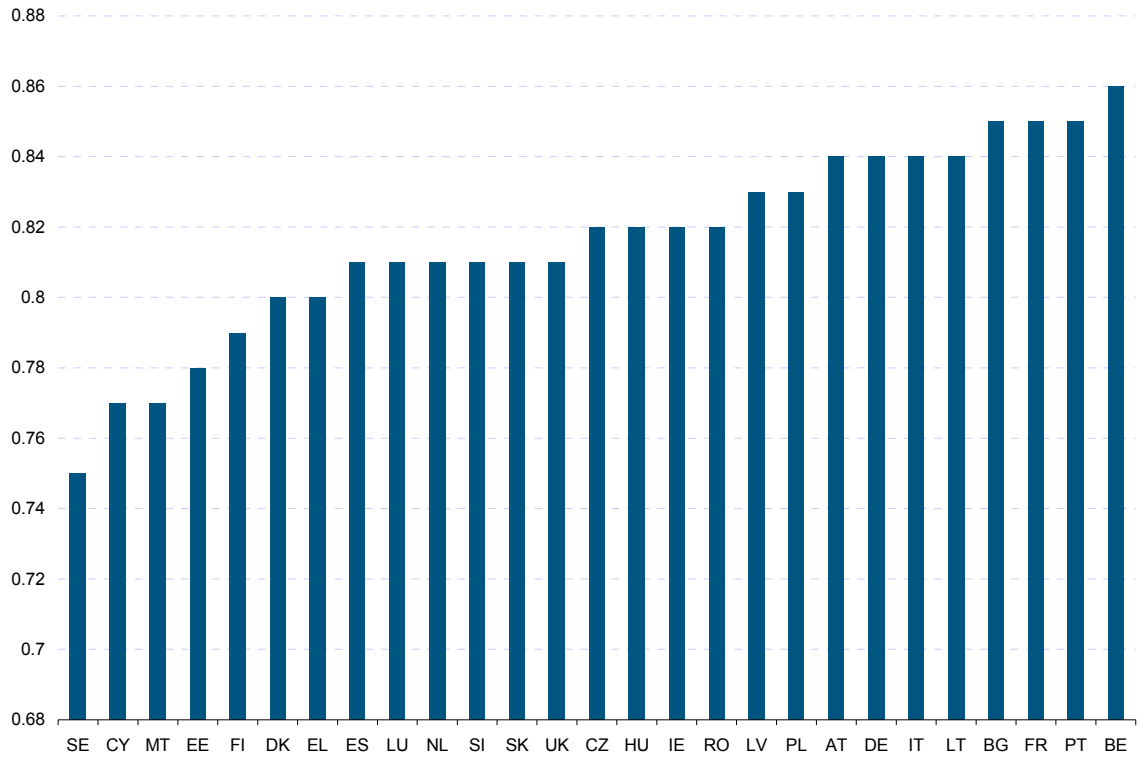
All the items in our proposed MD indicator are highly correlated with the latent construct (the highest correlations are for Pocket money, Leisure and Clothes) and their individual deletion would (slightly) decrease the reliability of the scale. If we drop 'enforced lack of a car' from the list of selected items because of the 'normativity' issue raised above (see Section 12.1), then the Alpha remains unchanged at EU level (0.85; see Table 13), with national values ranging from 0.74 to 0.85.

Table 13: Correlation of each item with total and Alpha if the item is deleted, EU-27, whole population, 2009

	Correlation with total	Alpha if deleted
Car	0.41	0.85
Arrears	0.39	0.85
Unexpected expenses	0.56	0.84
Warm	0.44	0.84
Computer/Internet	0.37	0.85
Furniture	0.56	0.84
Meat	0.48	0.84
Holidays	0.58	0.83
Clothes	0.60	0.83
Shoes	0.36	0.85
Drink/meal	0.59	0.83
Leisure	0.64	0.83
Pocket money	0.61	0.83

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 17: Cronbach's alpha by country, whole population, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

The proposed scale is also highly reliable for different age groups, with an Alpha of 0.86 for children aged 0-17 and 0.83 for older people (aged 65+). These results lend support to the choice we made in Section 5.2 to use a common scale for the whole population, including older people.

13.1.2. Incidence at item and national level

The incidence of each individual MD item retained in the final list for the whole population is presented at national level in Annex 6 (Table A11). These rates are compared with the EU-27 averages in Table 14. A ratio higher than one indicates that the national proportion of people deprived for a particular item is higher than the EU-27 average. Table 14 is colour coded as a 'heat map' to help highlight national patterns. High incidences of deprivation above the EU average are highlighted in red/orange and low incidences of deprivation are shown in blue. Several countries have consistently low incidences of deprivation. So, in FI, DK, NL, LU and SE MD incidences are below or equal to the EU average for all items, and most MD incidences are below or equal to 50 % of the EU average. By contrast, some newer Member States have consistently (very) high levels of deprivation. This is especially the case for BG, RO and LV where MD incidences are at least 120 % of the EU average and where, for more than half of the items, deprivation levels are at least twice the EU average (sometimes much higher than twice).

13.1.3. Aggregated scale - Illustrations

Figure 18 presents the distribution for the whole population (aged 0+) according to the level of MD shown by our proposed indicators. It illustrates the large variations in MD levels between EU countries, with national proportions of people lacking no item varying from around 10 % (BG, RO, LV, HU) to more than 70 % (SE, DK, NL).

Table 14: 'Heat map' providing for each item and country the ratio between the proportion of people lacking the item in the country and the proportion of people lacking the same item at the EU-27 level, whole population, 2009

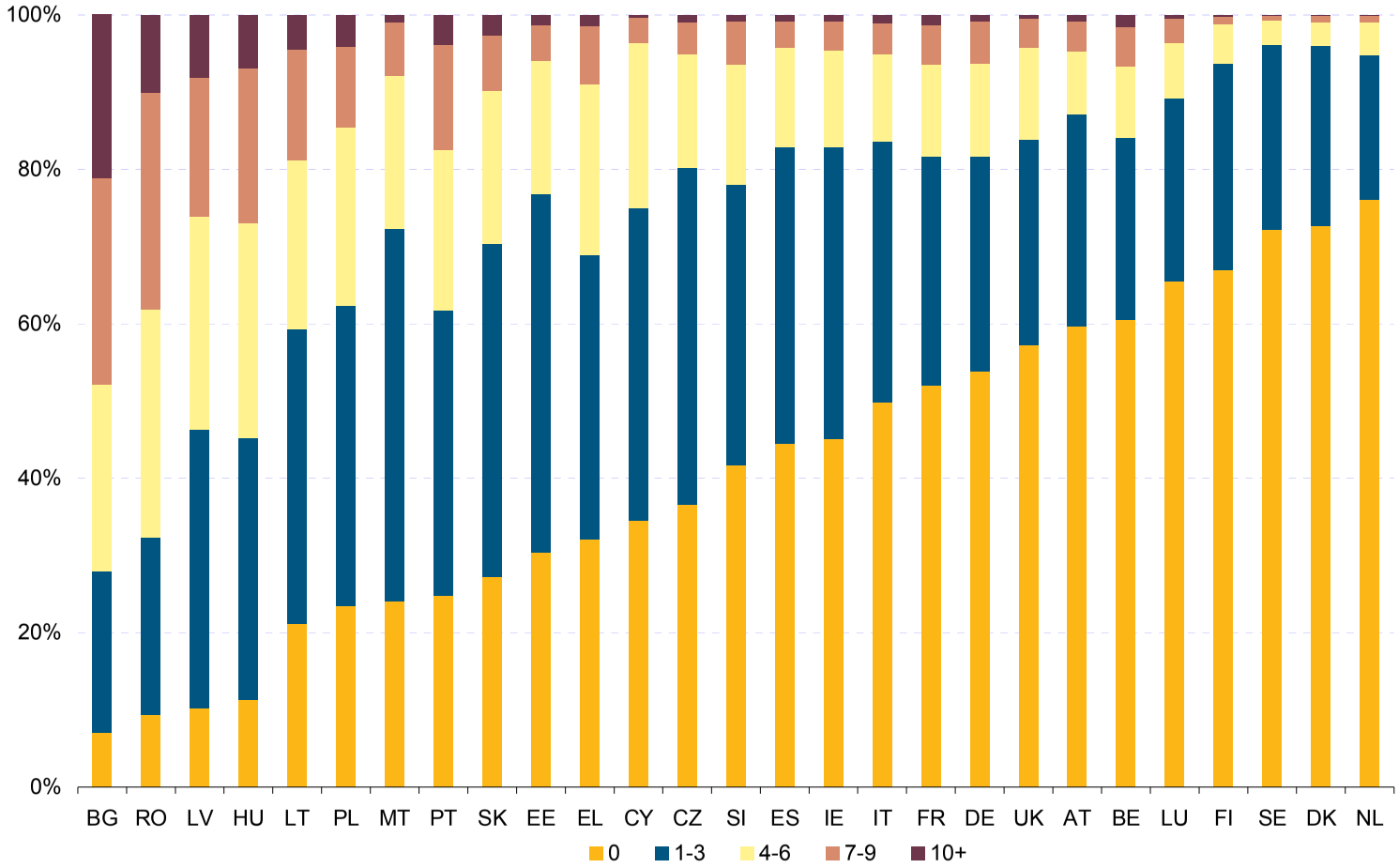
	BG	RO	LV	HU	LT	PT	PL	SK	EL	MT	EE	SI	CY	CZ	DE	FR	IT	IE	BE	ES	UK	AT	FI	DK	NL	LU	SE
Inadequate warmth	7.1	2.4	1.8	1.0	2.7	3.2	1.8	0.4	1.8	1.2	0.2	0.6	2.1	0.6	0.6	0.7	1.2	0.4	0.6	0.7	0.7	0.3	0.1	0.1	0.1	0.0	0.1
Clothes	5.4	3.3	3.3	3.1	2.3	2.0	1.5	1.0	1.0	1.6	0.9	1.3	0.6	0.5	0.7	0.8	0.8	0.5	0.6	0.3	0.6	0.6	0.6	0.6	0.2	0.4	0.2
Computer & Internet	4.6	3.8	1.4	1.8	1.8	1.6	2.0	2.0	2.2	0.2	1.2	0.6	0.4	1.4	0.4	0.8	1.0	0.8	1.0	0.8	0.4	0.8	0.6	0.2	0.2	0.2	0.0
Meat, fish…	4.1	2.7	2.6	3.0	2.2	0.4	1.9	2.7	0.9	1.1	0.8	1.2	0.4	1.1	1.0	0.8	0.7	0.2	0.6	0.2	0.4	1.1	0.3	0.1	0.2	0.1	0.1
Shoes	3.7	3.0	3.3	1.0	0.7	2.3	1.0	1.0	0.3	0.3	0.7	0.7	0.3	0.3	1.0	1.3	0.7	0.7	0.3	0.3	0.7	0.3	0.3	0.3	0.3	0.3	0.0
Arrears	3.2	2.5	2.0	2.0	0.9	0.8	1.3	1.2	2.6	0.7	1.1	1.6	1.9	0.5	0.5	1.0	1.2	1.3	0.6	0.8	0.4	0.6	1.0	0.5	0.4	0.4	0.6
Drink/meal	3.0	3.8	1.6	2.6	1.7	1.5	0.9	0.6	0.4	1.3	0.6	0.4	0.3	0.2	1.5	0.4	0.7	0.6	0.7	0.5	0.7	0.5	0.1	0.1	0.1	0.3	0.5
Furniture	2.9	2.6	2.3	2.1	1.7	2.0	1.3	1.5	1.7	1.7	1.6	1.3	1.7	1.7	0.7	1.2	0.1	0.6	0.7	1.3	0.5	0.4	0.4	0.4	0.7	0.5	0.2
Car	2.8	5.2	2.9	2.3	1.7	1.1	1.6	2.1	0.9	0.2	2.0	0.3	0.1	1.1	0.7	0.4	0.2	1.0	0.8	0.4	0.6	0.6	0.9	0.9	0.4	0.2	0.2
Pocket money	2.8	2.9	1.9	2.1	1.9	1.4	1.2	1.1	0.6	0.8	0.7	0.6	0.3	0.7	0.8	0.8	1.0	0.8	0.6	0.6	1.0	0.7	0.1	0.3	0.3	0.4	0.2
Leisure activity	2.5	3.2	1.9	1.8	2.0	1.4	1.4	0.6	1.1	0.9	0.5	0.9	0.4	0.4	1.1	0.6	0.9	0.4	0.7	0.5	0.8	0.8	0.2	0.2	0.4	0.3	0.2
Unexpected expenses	1.7	1.2	2.0	2.1	1.5	0.8	1.4	1.0	0.8	0.8	0.9	1.2	1.1	1.1	1.0	0.9	0.9	1.4	0.7	0.9	0.9	0.7	0.8	0.7	0.5	0.7	0.5
Holidays	1.6	2.1	1.6	1.8	1.0	1.7	1.6	1.5	1.2	1.7	1.3	0.8	1.1	1.1	0.6	0.8	1.1	1.1	0.7	1.1	0.7	0.7	0.4	0.3	0.4	0.4	0.2

Reading note: The proportion of people unable to avoid arrears is only 40 % of the EU-27 weighted average in the UK, the Netherlands and Luxembourg, whereas in Bulgaria it is 3.2 times higher than in the EU as a whole.

Notes: The table is sorted horizontally according to the national mean MD level and vertically according to the national ratios of the country with the highest mean MD level (i.e. BG in this case), with the most materially deprived countries on the left and with the items sorted highest to lowest. '~0' refers to values that are below 0.05.

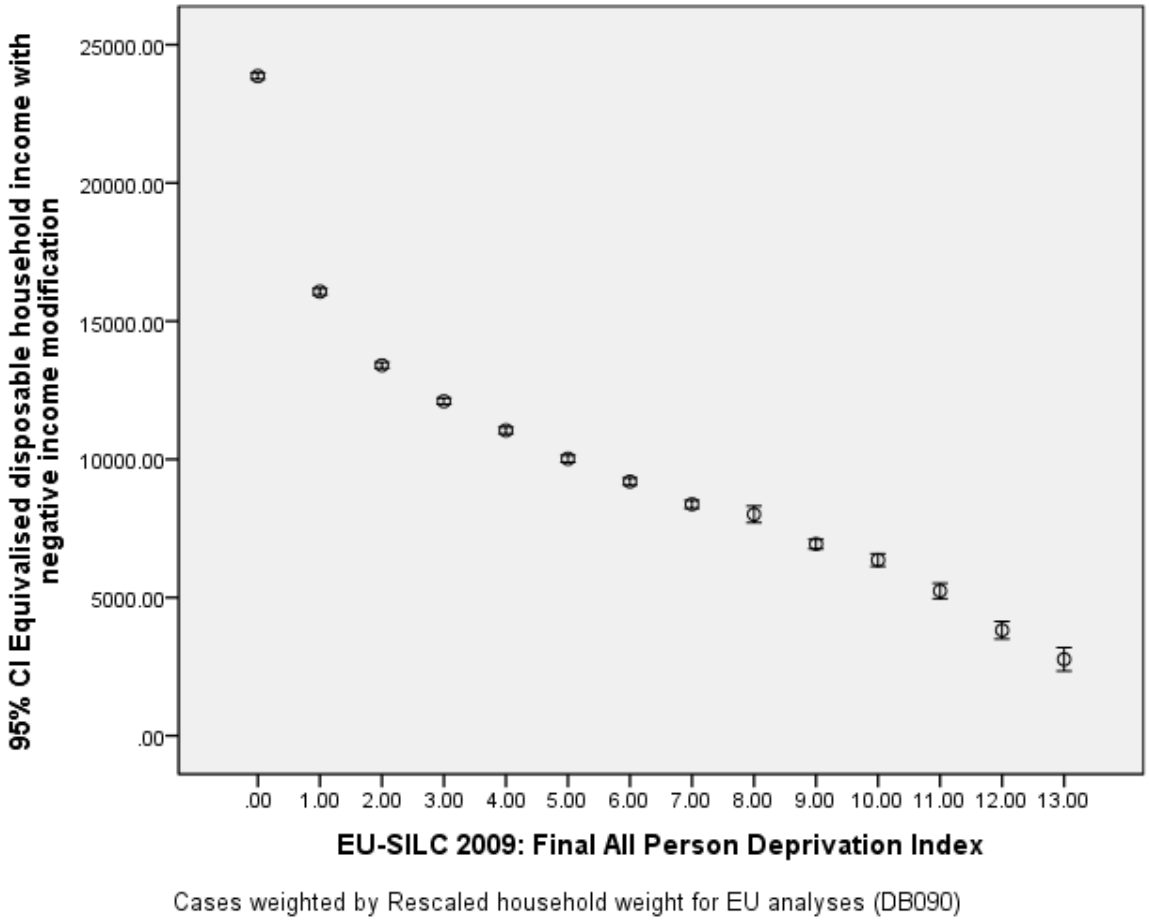
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 18: Distribution of the population by the level of MD according to the proposed 13-item MD indicators, by country, whole population, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 19: Mean equivalised disposable income by deprivation level as shown by the proposed 13-item MD indicator, EU-27, whole population, 2009
(95 % confidence interval, euros)

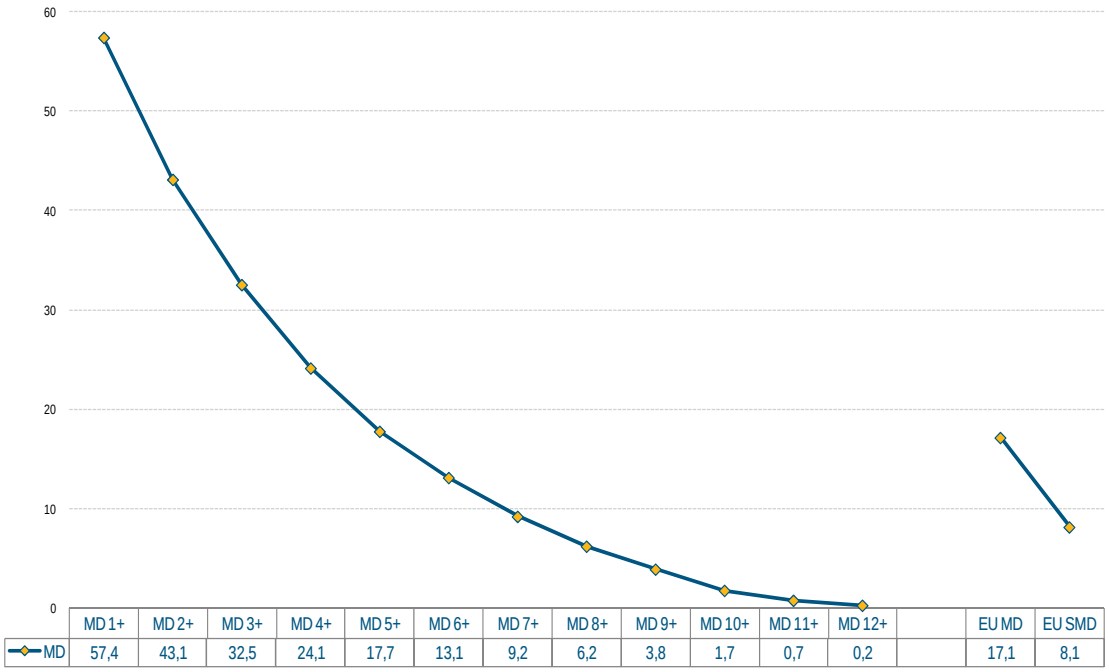


Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 19 illustrates the decreasing relation between income and material deprivation for our proposed 13-item scale, which provides a useful ex-post validation of the scale. It also shows the mean equivalised income (and its 95 % confidence interval) associated with each MD level. The same figure is provided for each Member State in Figure A7 (Annex 7). Whelan (1997, p. 219) argues that 'such association cannot be perfect or we would not need the deprivation measure. In particular, on the basis of earlier work, we expect to identify a significant number of low-income households where deprivation is not observed. On the other hand, we would like to minimise the extent to which deprivation is reported in 'high' income households.'

We have also tested different thresholds (common to all countries), as illustrated in Figure 20 (EU-27) and in Table 15 (country level). Our proposed scale clearly provides a broader range of choices for selecting deprivation threshold values than the current EU MD indicator.

Figure 20: MD rates according to different MD thresholds (comparison between the proposed 13-item MD indicator and the current MD indicators), EU-27, whole population, 2009, (%)



	MD 1+	MD 2+	MD 3+	MD 4+	MD 5+	MD 6+	MD 7+	MD 8+	MD 9+	MD 10+	MD 11+	MD 12+		EU MD	EU SMD
MD	57,4	43,1	32,5	24,1	17,7	13,1	9,2	6,2	3,8	1,7	0,7	0,2		17,1	8,1

Notes: 'MD 5+'… 'MD 9+' refer to a lack of 5+… 9+ items in our proposed 13-item indicator. 'EU MD' refers to the current indicator of MD (3 lacks out of 9) whereas 'SMD' refers to the current indicator of 'severe' MD used in the definition of the Europe 2020 social inclusion target (4 lacks out of 9).

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

The choice of the threshold(s) to be used for our proposed MD scale will need to be made according to a clear and transparent methodology. It is beyond the scope of this paper to provide a detailed sensitivity analysis of the different potential thresholds. For illustrative purposes, the rest of this section uses two different thresholds which we have chosen simply because they lead to a proportion of people deprived that is close to that provided by the 'standard' and 'severe' MD indicators currently used at EU level; this proximity between the two measures enables us to compare the figures provided with our proposed measure with those produced by the current EU measures. The comparisons in this paper should thus not be taken as if we believed that the current EU standard/severe MD indicators provide 'the' right benchmarks, i.e. the only appropriate threshold levels for satisfactorily identifying deprived people in the EU.

As can be seen from Figure 20, a threshold of at least five items lacked (out of 13) leads to a MD rate for the EU-27 weighted average that is quite close to that provided by the current EU-27 MD indicator (3+ items out of nine (EU MD)). (See Annex 5 for the calculation of EU weighted averages.) A threshold of at least seven items lacked (out of 13) leads to a MD rate for the EU-27 weighted average that is slightly higher than the current EU severe MD indicator (4+ items out of nine (EU SMD)).

Table 15 presents detailed information by country and Annex 8 provides various breakdowns for MD5+ and MD 7+.

Table 15: MD rates according to different thresholds applied to the proposed 13-item MD indicator and current MD indicators by country, whole population, 2009, (%)

	Proposed 13-item MD indicators				Current MD indicators	
MD	MD 5+	MD 6+	MD 7+	MD 8+	MD 9+	EU SMD
AT	10.7	7.7	5.5	3.3	1.8	4.8
BE	11.5	8.6	6.1	4.0	2.4	5.2
BG	62.6	54.0	44.9	37.1	28.3	41.9
CY	12.0	6.6	3.9	2.0	1.1	7.9
CZ	12.5	8.1	5.5	3.3	2.0	6.1
DE	15.5	10.9	7.5	4.8	2.6	5.4
DK	4.8	3.0	1.8	1.2	0.6	2.3
EE	14.5	9.1	5.7	3.4	1.9	6.2
EL	20.7	13.6	8.1	5.0	2.4	11.0
ES	10.9	7.2	4.3	2.5	1.3	3.5
FI	5.3	3.4	1.8	1.0	0.5	2.8
FR	13.9	10.1	6.8	4.5	2.8	5.6
HU	43.9	35.2	26.4	18.5	11.7	20.8
IE	11.9	8.4	4.9	2.5	1.4	6.1
IT	13.5	9.3	6.0	3.8	2.1	7.0
LT	30.5	24.9	18.4	13.1	9.1	15.1
LU	5.9	4.0	2.6	1.2	0.7	1.1
LV	42.8	33.7	25.5	18.3	12.2	21.9
MT	18.6	11.8	7.0	3.8	2.0	4.7
NL	5.0	3.0	1.9	1.1	0.7	1.4
PL	26.2	18.9	13.5	9.3	6.4	15.0
PT	28.3	22.0	16.1	10.1	6.5	9.1
RO	60.4	50.5	40.0	29.2	19.0	32.2
SE	2.6	1.7	0.9	0.5	0.2	1.6
SI	15.5	10.6	7.0	4.2	2.1	6.1
SK	19.6	13.7	9.1	6.3	4.0	11.1
UK	11.3	7.7	4.4	2.3	1.4	3.3
EU-27	17.7	13.1	9.2	6.2	3.8	8.1

Notes: 'MD5+'… 'MD 9+' refer to a lack of 5+… 9+ items in our proposed 13-item indicator. 'EU MD' refers to the current indicator of MD (3 lacks out of 9) whereas 'SMD' refers to the current indicator of 'severe' MD used in the definition of the Europe 2020 social inclusion target (4 lacks out of 9).

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation

13.1.4. Overlap with the current EU MD indicators

The previous results presented in this section provide MD indicators at the national level but do not tell us anything about the degree of overlap between our proposed EU MD indicator and the current EU MD indicators.

Table 16 shows that, at EU level, when the threshold is set at 5+ items, 13 % of people are deprived according to both our proposed indicator *and* the current EU 'standard' MD (3+ lacks out of 9) indicator. Around 9 % of people are identified as deprived either by our proposed indicator *or* by the current EU MD indicator – but not by both indicators at the same time; i.e., they are 'EU MD *only*' or 'New MD *only*'.

Table 16: Overlap between the proposed 13-item MD indicator (threshold 5+) and the current EU MD indicator (3+), EU-27, whole population, 2009, (%)

	Both (1)	None (2)	EU MD 'only' (3)	New MD 'only' (4)
5+ items	13.1	78.3	4.0	4.6

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation

Table 17 shows that 5.3 % of people are both 'severely' deprived (according to the current (4+) Europe 2020 definition) *and* lacking at least seven items according to our proposed MD scale. With the threshold set at 7+ items, 2.8 % of people are identified as not deprived according to our proposed indicator whereas they are severely deprived according to the current EU MD indicator. This proportion is 2.9 % for those 'only' deprived according to our proposed scale.

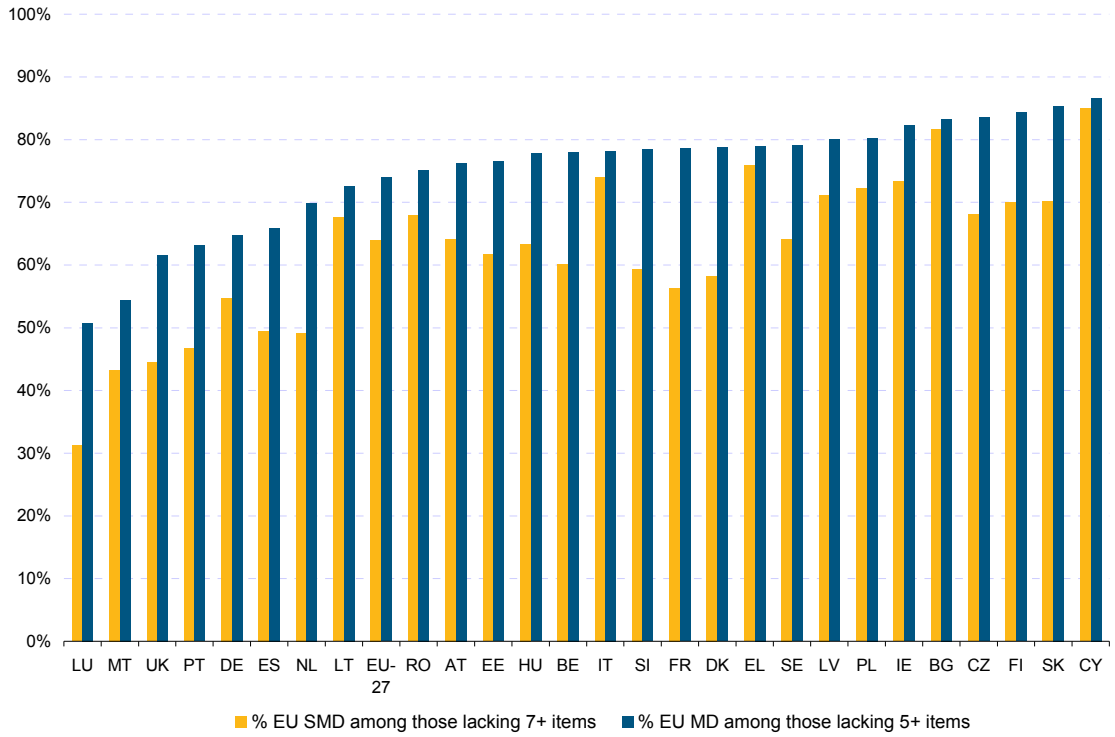
Table 17: Overlap between the proposed 13-item MD indicator (threshold 7+) and the current EU severe MD indicator (4+), EU-27, whole population, 2009, (%)

	Both (1)	None (2)	EU SMD 'only' (3)	New MD 'only' (4)
7+ items	5.3	89	2.8	2.9

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 21 provides information on the proportion of those (severely) deprived among those identified by our proposed MD indicator (with thresholds set at 5+ and 7+ lacks) at the national level.

Figure 21: Proportion of those (severely) deprived among those identified by the proposed 13-item MD indicator (thresholds 5+ and 7+), whole population, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

At EU-27 level, the overlap between those severely deprived, according to our proposed indicator (lacking 7+ items) and the current EU MD indicator (lacking 4+ items), is 64 %. It is lowest (less than 50 %) in LU, MT, UK, PT, ES and NL and highest (more than 80 %) in BG and CY. The overlap between those deprived, according to our proposed MD indicator (lacking 5+ items) and the current EU MD indicator (lacking 3+ items), is higher in all countries, reaching around 80 % in many Member States. It is, however, as low as 50 % in LU and 54 % in MT (74 % at EU-27 level).

The question of whether or not those identified by the current indicators and those identified by our proposed indicator share the same characteristics is explored below in Figures 22-24 which also provide some useful ex-post validation of our scale.

Figure 22a shows, for the EU as a whole, that, compared with the group that is deprived according to the EU MD indicator, those deprived on our proposed 13-item indicator (5+ threshold) have similar levels of income poverty (headcount and gap), a similar share of people with difficulties in making ends meet or with health problems and a similar proportion of people aged under 60 years living in households with very low work intensity. They also have a lower income (mean equivalised income: 5,734 PPS vs. 5,955 PPS).

Figure 22b shows, for the EU as a whole, that, compared with the group that is deprived 'only' according to the EU MD indicator, those 'only' deprived on our proposed 13-item indicator (5+ threshold) have similar levels of income poverty (headcount and gap), face more difficulties with making ends meet and health problems than those 'only' deprived according to the EU MD indicator. They also have a lower income (mean equivalised income: 6,954 PPS vs.7,846 PPS). These results indicate that our proposed indicator (5+ threshold) has slightly greater validity than the current EU MD indicator (3+ threshold).

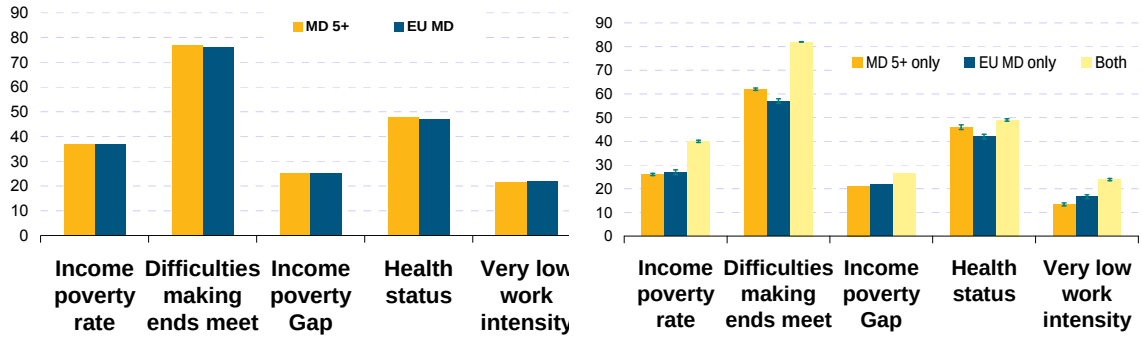
Unsurprisingly, those suffering from both forms of MD are by far the most exposed to these problems and have the lowest income (5,357 PPS).

Thus, we can conclude that not only is our proposed indicator (5+ item threshold) much more reliable than the current EU MD indicator (3+ threshold), it also has slightly greater validity.

Figure 22: Income poverty rate and gap, subjective poverty rate, share of people with health problems and of people aged less than 60 years living in household with a very low work intensity, EU-27, 2009
(Percentages with 95 % confidence interval) among:

a. those suffering from MD (5+ items lacked in our proposed 13-item MD indicator) or EU MD (3+ items lacked in the current 9-item indicator)

b. those suffering from MD 'only' (5+ items lacked in our proposed 13-item MD indicator), EU MD 'only' (3+ items lacked in the current 9-item indicator) or from deprivation on both the proposed and current indicators



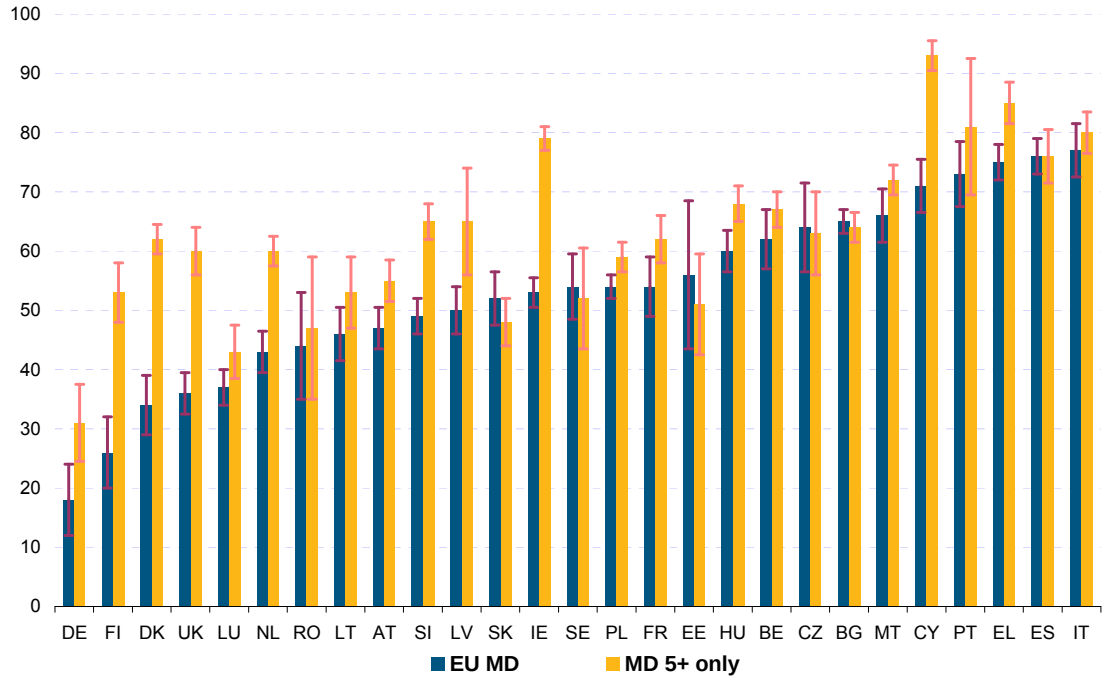
Notes: The 'MD 5+ only' category refers to those who suffer from 5+ lacks according to our proposed indicator but are not deprived according to the current EU MD indicator. The 'EU MD only' category refers to those who suffer from EU MD but are not deprived according to our proposed (5+) indicator. Finally, the 'Both' category consists of those who are deprived according to both MD indicators (EU MD and 5+ MD according to our proposed scale). For a definition of 'very low work intensity' households, see Section 1.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figures 23 and 24 illustrate some of these aspects at country level. Figure 23 compares the proportion of people facing difficulties with making ends meet for the categories of people MD 5+ 'only' and EU MD 'only'. In many countries, the orange line (95 % confidence interval of the proportion of people with difficulties among those MD 5+ 'only') is higher and does not overlap with the red line (95 % confidence interval of the proportion of people with difficulties among those EU MD 'only'). This indicates that people deprived according to our proposed MD indicator face significantly more financial strain (difficulties making ends meet) than those deprived according to the current MD measure. However, the differences are not significant for 13 countries (RO, LU, LT, AT, SK, SE, EE, CZ, BE, BG, MT, ES, IT).

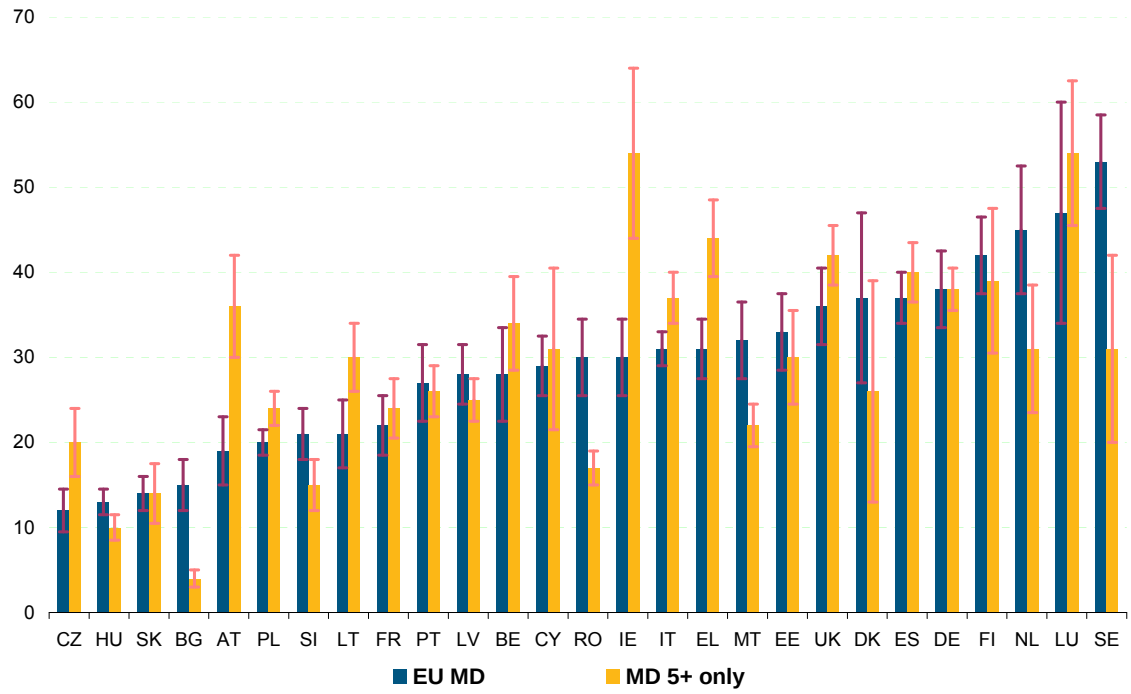
Figure 24 provides similar information for the income poverty rate. This indicates that people deprived according to our proposed MD indicator face significantly more income poverty risks than those deprived according to the current MD measure in CZ, AT, PL, LT, IE, IT, EL. The reverse is, however, true in four countries (BG, SI, RO and SE (the results for Sweden should be interpreted with caution given the large amount of missing deprivation data)).

Figure 23: Difficulties making ends meet for those suffering from MD (5+ items lacked in our proposed 13-item MD indicator) and for those suffering from EU MD (3+ items lacked in the current 9-item indicator), by country, whole population, 2009
(Percentages with 95 % confidence interval)



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 24: Poverty rate for those suffering from MD (5+ items lacked in our proposed 13-item MD indicator) and for those suffering from EU MD (3+ items lacked in the current 9-item indicator), by country, whole population, 2009
(Percentages with 95 % confidence interval)



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

These figures show that our proposed indicator (5+ threshold) has greater validity than the current EU 'standard' MD (3+ lacks out of 9). This is a significant achievement given that the current EU MD indicator has a high level of validity in many countries.

Table 18 provides the composition in terms of age and household type of the population in each of the three MD groups (MD 5+ 'only, 'EU MD' and 'Both'; see above). Again, the differences are often not very large and show a broad stability in the composition of people considered as deprived. Those MD 5+ 'only' are slightly more likely to live in a two-adult household (with or without children) and less likely to live alone or in complex households. In terms of age group, they are more likely to be children or older people (i.e., in the age groups 0-17 and 65 years or more). Those identified as deprived by both indicators have distinctive features: with high proportions aged under 65 years or living in single parent households or complex households with children.

Multinomial logistic regressions confirm these conclusions([32]).

([32]) The results are available by request to the authors.

Table 18: Composition of the population suffering from MD 'only' (5+ items lacked in our proposed 13-item MD indicator), EU MD 'only' (3+ items lacked in the current 9-item indicator) or from deprivation on both the proposed and current indicators, EU-27, whole population, 2009, (%)

%	Total population	EU MD 'only'	MD 5+ 'only'	Both MD
Age group	**100**	**100**	**100**	**100**
0-17 years	19	20	22	23
18-64 years	65	65	62	64
65 years or more	16	15	16	13
Household type	**100**	**100**	**100**	**100**
One person household	13	17	11	16
2 adults, no dependent children, both adults under 65 years	13	7	11	9
2 adults, no dependent children, at least one adult aged 65 years or more	11	6	11	7
Complex households without dependent children	12	15	11	11
Single parent household, one or more dependent children	4	7	7	9
2 adults, one dependent child	12	11	10	9
2 adults, two dependent children	17	14	16	12
2 adults, three or more dependent children	7	6	8	9
Complex households with dependent children	11	16	14	17
Others	0	1	0	1

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

13.1.5. Impact on the Europe 2020 social inclusion target

Table 19 compares the composition of the current social inclusion target (people at risk of poverty and social exclusion (AROPE)) using either the current 'severe' MD (SMD) indicator or our proposed MD indicator (with a threshold set at 7+ deprivations).

Table 19: Intersections of the Europe 2020 'At risk of poverty or social exclusion (AROPE)' target, using either the current EU severe MD indicator (4+) or our proposed MD indicator (threshold 7+), EU-27, whole population, 2009, (%)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	Total AROPE
Income poverty								
SMD/MD 7+								
Very Low work intensity								
AROPE (using SMD)	9.9	3.8	2.6	2.4	2.6	0.5	1.4	23.1
AROPE (using MD 7+)	9.7	4.4	2.5	2.6	2.4	0.5	1.5	23.7

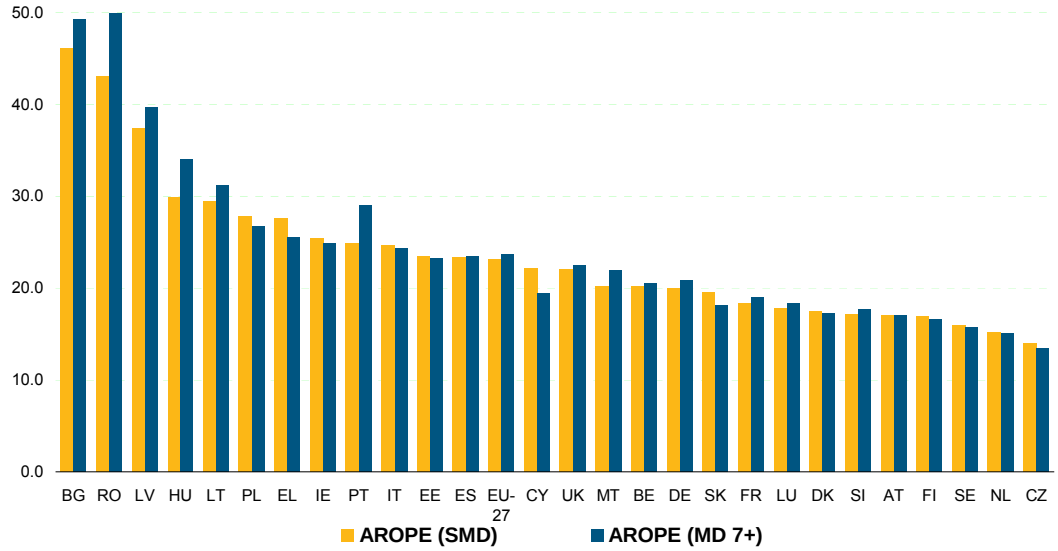
Notes: In each column, the grey areas show the categories of people affected by the problem(s) in the Europe 2020 target. So, column (1) refers to those people in the target who are 'only' income poor (i.e. not severely deprived nor living in a very low work intensity household). 9.9 % of the total population at EU level are in this situation if the MD criterion chosen for the AROPE target is the current severe MD indicator ('SMD'); this figure is 9.7 % if the MD criterion chosen is our proposed indicator with a threshold set at 7+ items lacked ('MD 7+). In column (2), if the MD criterion chosen is our MD 7+ indicator, then the proportion of EU citizens who are 'only' deprived is 4.4 %; with the current SMD indicator, it is 3.8 %. In column (4), the proportion of people at risk of income poverty and severely deprived is 2.4 % of the total EU population according to SMD as opposed to 2.6 % according to MD 7+.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

The total proportion of people targeted at EU level (last column) is 23.1 % according to the current SMD definition and 23.7 % according to our (7+) proposed indicator. This very small difference is mainly due to a small increase in the proportion of people 'only' deprived (column 2), from 3.8 % (current SMD) to 4.4 % (our definition (7+)). These small differences are unlikely to be statistically significant.

At the country level, differences in the total targeted population may be larger, especially in BG, RO, LV, LT, HU and PT (see Figure 25).

Figure 25: People at risk of poverty and social exclusion, using either the current EU severe MD indicator (4+ items out of 9) or our proposed MD indicator (7+ items out of 13), whole population, 2009, (%)



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

13.2. Children

13.2.1. Reliability of the proposed scale

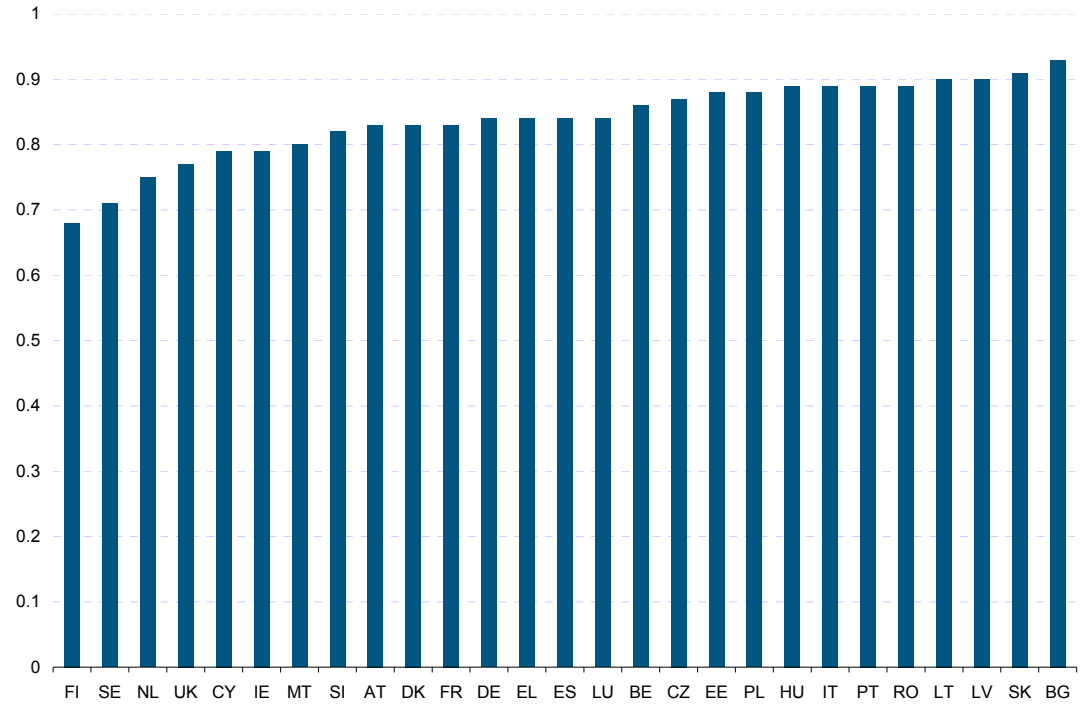
The Cronbach's alpha for the 18 items retained for our suggested child (1-15) MD indicator is 0.90 for the pooled EU-27 dataset. The national Alphas range from 0.68 in Finland to 0.93 in Bulgaria (see Figure 26). If we drop 'enforced lack of a car' from the list of selected items because of the 'normativity' issue raised above (see Section 12.1), then the Alpha calculated at EU-27 level remains virtually unchanged (0.89), with national figures ranging between 0.67 and 0.92. All the items are highly correlated with the latent construct and their individual deletion would (slightly) decrease the reliability of the scale (see Table 20). Items such as Homework and Arrears show the lowest correlation with the total.

Table 20: Correlation of each item with total and Alpha if the item is deleted, EU-27, child population, 2009

	Correlation with total	Alpha if deleted
Car	0.46	0.89
Arrears	0.37	0.90
Warm	0.42	0.90
Computer/Internet	0.45	0.90
Furniture	0.46	0.89
School trips	0.62	0.89
Books	0.64	0.89
Celebrations	0.60	0.89
Clothes	0.56	0.89
Friends	0.64	0.89
Fruits/vegetables	0.56	0.89
Holidays	0.51	0.89
Homework	0.38	0.90
Indoor games	0.66	0.89
Leisure	0.65	0.89
Meat	0.55	0.89
Outdoor equipment	0.69	0.89
Shoes	0.49	0.89

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 26: Cronbach's alpha by country, child population, 2009, (%)



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

13.2.2. Incidence at item and national level

The incidence of each individual MD item retained in our proposed final child deprivation list is presented at national level in Annex 6 (Table A11). These rates are compared to the EU-27 averages in Table 21, with a ratio higher than one indicating that the national proportion of people deprived for a particular item is higher than the EU-27 average. A heat map highlights the national patterns.

Some countries (LU, DK, NL, FI and SE) have consistently low rates of child deprivation (40 % of the EU-27 weighted average or less for 14 out of the 18 MD items). However, it should be noted that, in LU, the proportion of children lacking a place to do homework is 1.5 times that observed for the EU as a whole. By contrast, in BG and RO, child deprivation levels are all at least twice the EU average; for more than half of the items, deprivation levels are more than four times higher than the EU-27 average.

Table 21: 'Heat map' providing for each item and country the ratio between the proportion of people lacking the item in the country and the proportion of people lacking the same item at the EU-27 level, child population, 2009

	RO	BG	HU	LV	PT	SK	LT	PL	EL	IT	EE	CZ	BE	MT	FR	IE	DE	CY	ES	SI	AT	UK	LU	DK	NL	FI	SE
Children: Indoor games	10.4	4.8	2.6	2.2	2.2	1.2	1.4	1.6	0.8	1.0	0.4	0.6	0.4	0.4	0.2	~0	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	~0	~0	~0
Children: Outdoor equipment	9.5	5.5	3.2	3.3	1.2	1.8	1.7	1.7	1.0	0.7	1.0	1.0	0.7	0.8	0.3	0.2	0.3	0.5	0.3	~0	0.5	0.2	0.2	0.3	~0	0.2	0.2
Children: School trips	7.1	4.0	1.1	1.6	1.6	1.1	1.1	1.4	1.0	1.0	0.6	0.4	0.4	0.1	0.6	0.6	0.3	0.1	0.6	0.1	0.4	0.4	0.6	0.1	~0	0.1	0.1
Children: Suitable books	6.4	5.8	2.6	2.4	2.4	2.0	1.6	1.8	1.2	1.4	0.8	0.4	0.8	0.2	0.4	0.2	0.4	0.6	0.2	0.2	0.4	~0	0.2	0.2	~0	~0	~0
Household: Car	6.1	3.0	2.7	3.1	1.2	1.9	1.6	1.6	0.7	0.2	1.7	1.3	0.8	0.1	0.4	1.1	0.6	0.1	0.4	0.2	0.7	0.8	0.2	0.6	0.3	0.4	0.2
Children: Fresh fruits	5.8	8.5	4.5	3.8	1.0	2.5	2.3	1.8	0.3	0.5	2.8	0.5	0.5	0.5	1.3	0.3	0.5	0.3	~0	0.5	0.3	0.3	~0	0.3	0.3	0.3	~0
Children: Meat	5.8	6.2	2.6	2.0	1.0	2.8	1.8	1.0	1.0	1.0	1.2	0.8	0.6	0.8	0.4	0.4	1.0	0.2	~0	0.4	0.4	0.2	0.2	~0	0.2	~0	~0
Children: Celebrations	5.7	3.0	1.5	2.2	2.0	1.3	1.8	1.8	1.7	1.0	0.7	0.3	0.5	0.7	0.5	0.2	0.3	0.7	0.8	0.3	0.7	0.2	0.3	0.2	~0	~0	0.2
Children: Invite friends	5.3	4.7	4.3	3.0	2.9	1.7	1.4	1.1	0.7	1.0	0.6	0.4	0.4	0.6	0.4	0.1	0.4	0.3	0.6	0.3	0.7	0.3	0.3	0.1	0.1	~0	0.1
Children: Leisure	5.3	2.9	2.0	1.8	2.3	0.6	1.3	1.7	0.9	1.1	0.5	0.4	0.7	0.3	0.6	0.4	0.6	0.6	0.3	0.7	0.9	0.6	0.2	0.2	0.3	0.1	0.1
Children: Two pairs of shoes	4.5	11.0	1.3	2.8	1.3	1.8	0.3	0.8	0.3	0.8	1.3	0.5	1.0	0.8	1.5	1.0	1.0	~0	0.3	0.5	0.3	0.8	0.3	0.3	0.5	0.3	0.3
Household: Computer & Internet	4.5	4.2	1.8	1.7	1.5	1.7	1.7	1.3	2.2	1.0	0.7	1.2	0.7	0.2	0.5	0.8	0.2	0.5	1.0	0.3	0.5	0.5	0.2	0.2	~0	~0	~0
Children: Some new clothes	4.2	5.8	3.7	4.0	2.3	2.2	2.2	0.7	0.2	1.0	0.8	0.8	1.0	1.0	0.8	0.5	0.5	0.2	0.5	1.7	0.5	0.3	0.5	0.3	0.2	0.5	~0
Children: Place to do homework	3.7	2.3	0.7	0.7	2.0	1.0	0.8	0.7	2.0	1.8	0.8	0.8	1.2	0.7	0.5	0.3	1.2	0.7	0.5	0.7	0.5	0.3	1.5	0.3	0.7	0.3	0.5
Household: Replace worn-out furniture	2.6	2.7	2.2	2.2	2.0	1.6	1.6	1.2	1.5	0.1	1.5	1.5	0.8	1.7	1.2	0.8	0.8	1.5	1.3	1.1	0.6	0.6	0.6	0.4	0.6	0.4	0.2
Household: Inadequate warmth	2.4	7.1	0.9	2.0	2.9	0.4	2.3	1.8	2.0	1.2	0.1	0.4	0.7	1.1	0.6	0.6	0.9	1.8	0.7	0.4	0.2	0.7	~0	0.1	0.1	0.1	0.2
Children: Holidays	2.4	2.1	2.4	1.2	1.7	0.7	1.3	1.2	1.0	1.1	0.5	1.4	1.0	1.6	0.6	1.7	0.8	0.6	1.4	0.3	0.7	0.7	0.3	0.4	0.5	0.3	0.4
Household: Arrears	2.1	2.7	2.3	2.1	0.9	1.1	1.0	1.2	2.3	1.3	1.3	0.7	0.8	0.8	1.1	1.5	0.6	1.6	0.9	1.6	0.8	0.5	0.4	0.4	0.3	1.0	0.5

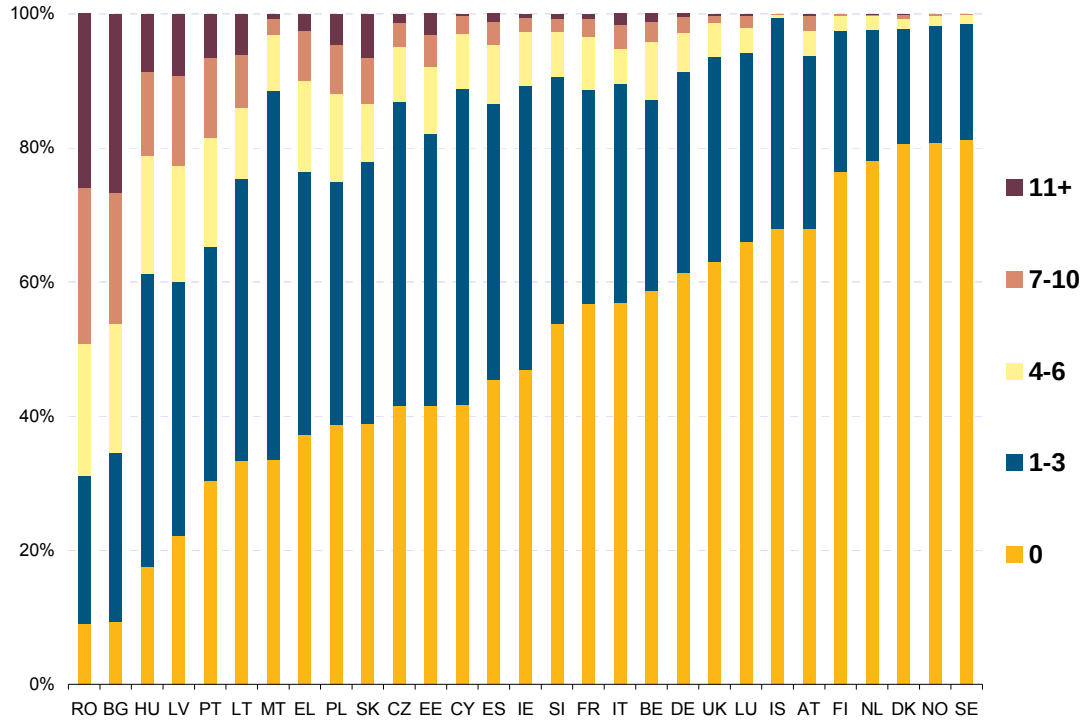
Notes: The table is sorted horizontally according to the national mean MD level and vertically according to the national ratios of the country with the highest mean MD level (i.e. RO in this case), with the most materially deprived countries on the left and with the items sorted highest to lowest. '~0' refers to values that are below 0.05.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

13.2.3. Aggregated scale - Illustrations

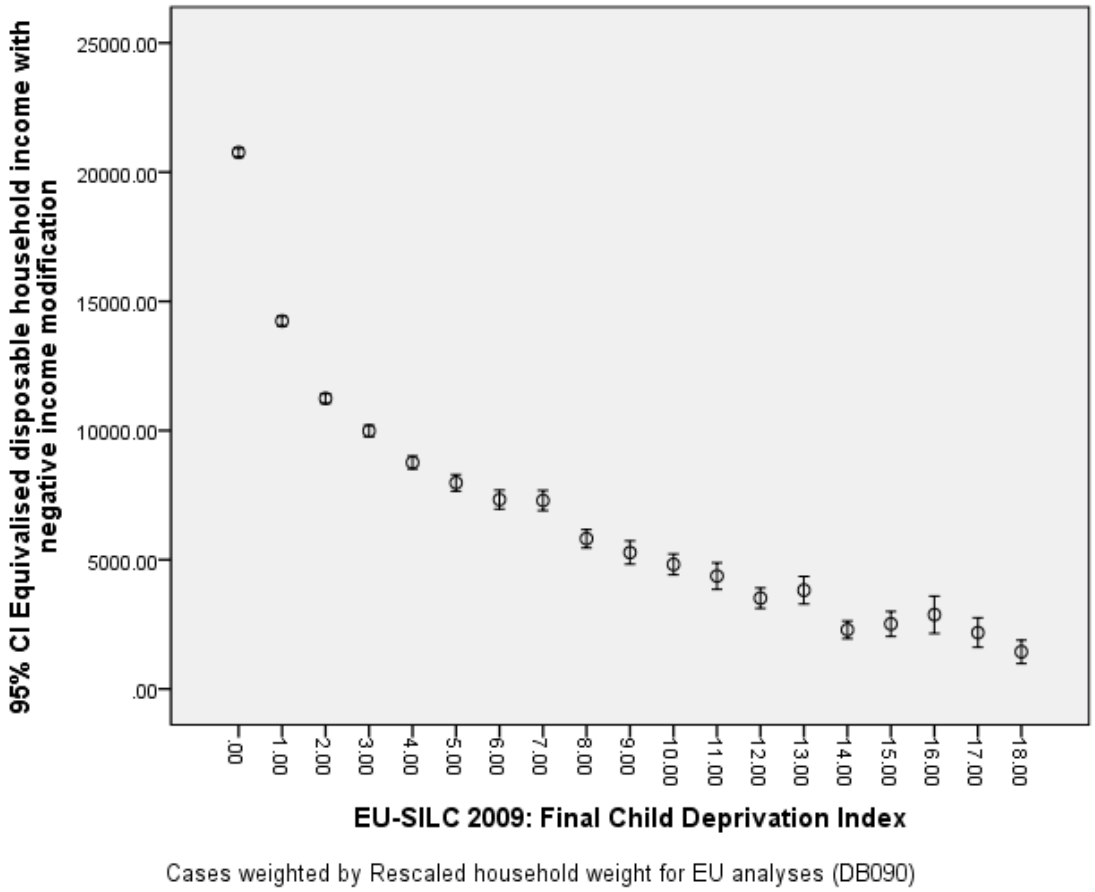
Figure 27 presents the distribution of the child population according to the level of MD shown by our proposed indicator. More than a quarter of children lack at least 11 items (out of 18) in Romania and Bulgaria. The proportion is also high in HU, LV, LT, PT, PL and SK.

Figure 27: Distribution of the population by the level of MD according to the proposed 18-item MD indicator, by country, child population, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 28: Mean equivalised disposable income, by deprivation level as shown by the proposed 18-item MD indicator, child population, EU-27, 2009
(95 % confidence interval, euros)

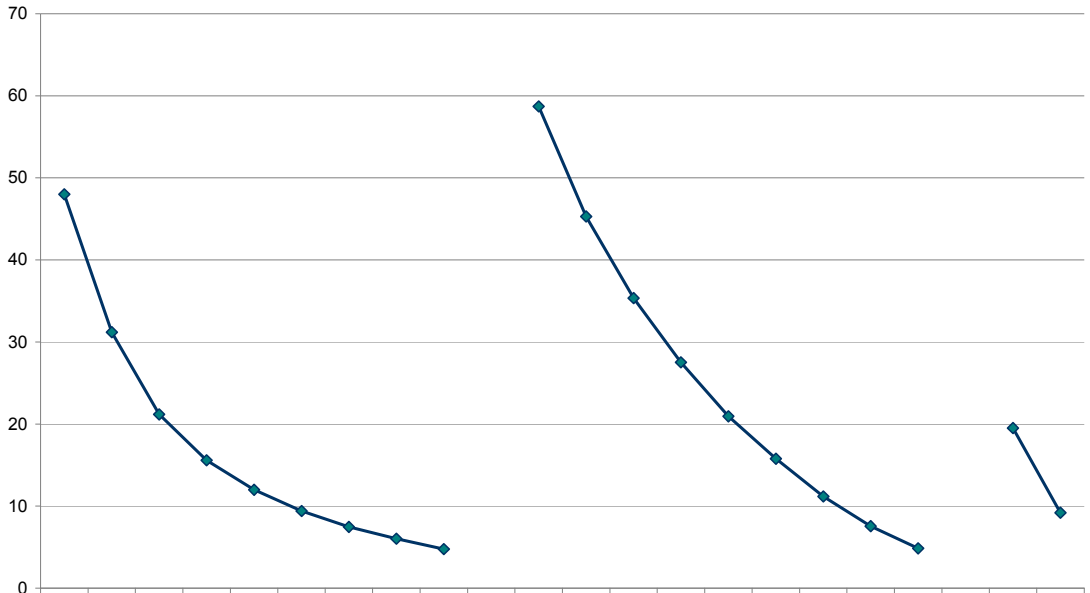


Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure 28 illustrates the decreasing relation between income and material deprivation, which provides a useful ex-post 'validation' of our children scale. The figure also shows the mean equivalised income associated with each deprivation MD level. Figure A8 in Annex 7 provides the same information at the country level.

Using the same logic as we did for the whole population indicator, we tested different thresholds (see Figure 29) and compared the results for children (aged 1-15 years) with the current EU MD indicators and also with the whole population indicator (MD).

Figure 29: MD rates according to different MD thresholds (comparison between the proposed 18-item MD indicator and the current MD indicators), child population, EU-27, 2009, (%)



	CH-MD 1+	CH-MD 2+	CH-MD 3+	CH-MD 4+	CH-MD 5+	CH-MD 6+	CH-MD 7+	CH-MD 8+	CH-MD 9+		MD 1+	MD 2+	MD 3+	MD 4+	MD 5+	MD 6+	MD 7+	MD 8+	MD 9+		EU MD	EU SMD
MD	48	31.2	21.2	15.6	12.0	9.4	7.5	6.0	4.8		58.7	45.3	35.4	27.5	20.9	15.8	11.2	7.5	4.8		19.5	9.2

Notes: CH-MD: Child specific scale (see Table 22 first column); MD: scale defined for the whole population (see Table 22 second column).

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

As the slope of the child scale is less steep than that of the current EU MD indicator, a variation of one unit in the chosen threshold has a lower influence on the child MD rate.

A threshold of 3+ items lacked (out of 18) leads to an EU-27 child MD rate of 21.2 %, which is the figure that is closest to the current EU MD rate (19.5 %) and which is also close to the proportion of children living in deprived households according to our proposed whole population indicator (lacking 5+ items from the 13-item whole population scale (20.9 %)).

A threshold of 6+ items lacked (out of 18) leads to an EU-27 child MD rate of 9.4 %.This is a figure quite close to the current EU severe MD indicator computed on the population aged 1-15 (9.2 % according to the current SMD definition) and also close to the proportion of children living in deprived households according to our proposed whole population indicator (lacking 7+ items from the 13-item whole population scale (11.2 %)). Annex 8 provides some more figures for our proposed children indicator (using the 6+ threshold).

13.2.4. Value added of the children scale

An important question is whether our proposed children scale (CH-MD) identifies the same at risk population as the scale defined for the whole population (MD).

Table 22 compares the items which compose the two indicators.

Table 22: Comparison of composition between the child MD indicator and the MD indicator for the whole population, 2009

Child indicator (CH-MD)	Whole population indicator (MD)
The household cannot afford for at least one child (but would like to be able to afford):	
Some new clothes	
Two pairs of shoes	
Fresh fruits & vegetables daily	
Meat, chicken, fish daily	
Suitable books	
Outdoor leisure equipment	
Indoor games	
Place to do homework	
Leisure activities	
Celebrations	
To invite friends	
School trips	
Holiday	
The household cannot afford:	
To keep home adequately warm	To keep home adequately warm
To replace worn-out furniture	To replace worn-out furniture
A car	A car
To avoid arrears	To avoid arrears
A computer and Internet	A computer and Internet
	A meal with meat, fish…
	One week annual holiday
	To face unexpected expenses
At least half of the adults living in the household cannot afford (but would like to have):	
	Some new clothes
	Two pairs of shoes
	Some money for oneself
	Drink/meal monthly
	Leisure activities

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

At the EU level, when the threshold is set at 3+ items for the child MD indicator (CH-MD) and at 5+ items for the whole population MD indicator (MD) (see Figure 29), the proportion of people deprived is effectively identical: 21.2 % (CH-MD) and 20.9 % (MD). Table 23 illustrates the degree of overlap between the two populations identified by these indicators. The proportion of people deprived according to both indicators is 16.4 %. 9.3 % of children are in one deprivation situation 'only' (4.8 %+4.6 %). The degree of overlap is also provided for higher thresholds (6+ for CH-MD with 7+ for MD), which identifies a proportion of children close to those suffering from severe MD at the EU level. There is a substantial proportion of children who are identified as deprived by only one measure.

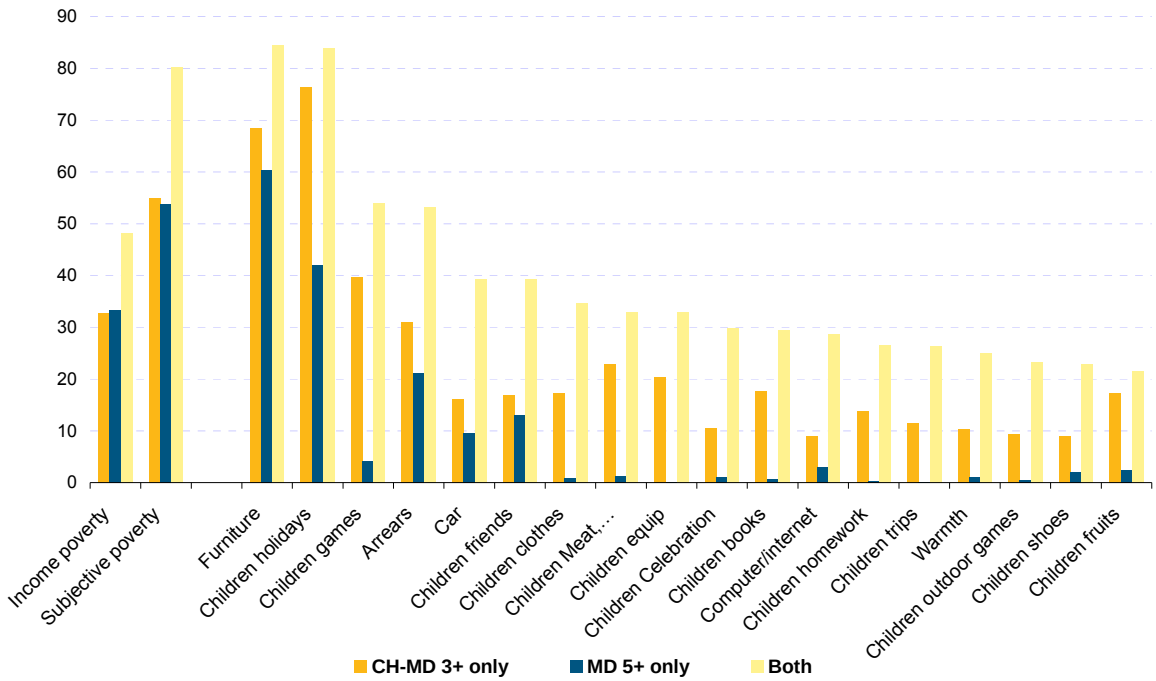
Table 23: Overlap between the child MD indicator and the whole population MD indicator, EU-27, child population, 2009, (%)

	Both (1)	None (2)	CH-MD 'only' (3)	MD 'only' (4)
CH-MD (3+) MD (5+)	16.4	74.3	4.8	4.6
CH-MD (6+) MD (7+)	6.8	86.3	2.5	4.3

Notes: CH-MD: child specific scale (see Table 22 first column); MD: scale defined for the whole population (see Table 22 second column).
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

In order to highlight the differences between the children identified as deprived by the different scales, Figure 30 compares the living conditions of those lacking 3+ items from our proposed children scale and 5+ items from our proposed whole population scale (aged 0+). The two groups of deprived children have very similar levels of income poverty and subjective poverty but differ a lot on almost all the other aspects of living conditions considered in the figure.

Figure 30: Living conditions of children suffering from CH-MD 'only' (3+ items lacked), MD 'only' (5+ items) or both CH-MD 3+ and MD 5+, EU-27, child population, 2009, (%)



Notes: CH-MD: child specific scale (see Table 22 first column); MD: scale defined for the whole population (see Table 22 second column). The 'MD 5+ only' category encompasses the people suffering from deprivation according to the whole population MD indicators (lack at least 5 items) but not from CH-MD. The 'CH-MD only' category regroups those who suffer from CH-MD but not from MD. The 'Both' category regroups those who suffer from both MD. Results related to children holidays need to be interpreted with caution given the large amount of missing data and the fact that this item was not collected in 9 countries (BE, CZ, DK, IE, ES, LT, HU, NL, SE); in these 9 countries, we have used the 'Household holiday item'.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Another important issue is the impact of the 'household' items on our proposed child MD. As mentioned before (Section 2.3), we have deliberately opted for a holistic and life-cycle approach to child MD. We have included both child specific deprivation and household deprivation items which directly affect children's lives. This has resulted in an 18-item deprivation indicator which includes 5 'household' items.

It is of course important to ensure that including MD items which affect all household members (both children and adults) does not result in an indicator which is not 'child-specific' enough. Table 24 (column 1) shows that at EU level among those children lacking 3+ items out of the 18 items included in the child MD indicator, on average 77 % lack at least 2 child-specific items – with national proportions varying between 94 % (in Romania) and 52 % (Ireland). So, even when we set the threshold at 'only' 3+ items there are relatively few children who appear as deprived because of more than one lacked household item. The second column provides similar figures; it shows the child-specific items lacked by children lacking 6+ items on the 18-item child MD indicator. Thus, we are confident that our measure captures both the specific deprivation experienced by children as well as the household deprivations which directly affect children's lives.

To conclude, our proposed 18 item child deprivation indicator is both more reliable and more valid, for measuring the deprivation of the child population aged 1-15, than either the current EU Material Deprivation indicator or our suggested whole population (aged 0+) MD indicator.

Table 24: Proportion of children lacking 4+ (2+) 'child-specific' items among those lacking 6+ (3+) items (out of 18), EU-27, child population, 2009, (%)

	Proportion of children lacking 2+ child-specific items among those lacking 3+ items (out of 18)	Proportion of children lacking 4+ child-specific items among those lacking 6+ items (out of 18)
RO	93.6	95.1
IT	91.3	96.8
BG	88.4	93.5
SK	85.5	97.8
PT	85.2	93.4
LV	82.5	90.7
PL	81.3	91.1
EE	79.8	92.8
DE	78.9	87.3
LT	78.5	90.4
HU	78	92.8
AT	78	85.1
EU-27	***77***	***91.1***
LU	74.7	91.8
FR	73.3	85
BE	72.3	87
UK	71	80.8
SI	69	80.1
NL	68.4	:u
DK	67.6	94.1
MT	67.2	94
EL	64.6	81.3
ES	62.6	83.1
FI	62.5	:u
CZ	61.7	79.6
SE	59	:u
CY	52.2	86.1
IE	51.7	73.0

Notes: 'child-specific items' (as opposed to 'household' items) refer to those 13 items included in our proposed child MD indicator whose focus is on the specific situation of children. u = unreliable (i.e. due to small sample size).

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

14. Conclusions

A primary objective of this paper is to propose an analytical framework for developing sound aggregate indicators of deprivation for the European Union that can be used for social monitoring purposes at both national and EU levels. Based on an analysis of the material deprivation (MD) data collected in the 2009 wave of EU-SILC, we have made proposals for a new MD indicator for the whole EU population (population aged 0 or more) and for a child-specific MD indicator (population aged 1-15).

The current EU MD indicator has a number of limitations (small number of items and weak robustness). In order to address these problems, we opted for a broad approach to the concept of MD that makes full use of the richness of the 2009 EU-SILC wave (core survey and thematic module on MD). This approach, which is both theory and data driven, has led to proposals for MD indicators covering some key aspects of living conditions (of the 0+ and the 1-15 populations) which appear to be customary across the whole EU and from which some people are excluded due to a lack of resources… which is a concept of deprivation that is consistent with Townsend's theory of relative deprivation and with the definition of poverty adopted by the EU Council of Ministers in 1985.

In choosing MD items for the child indicator, we opted for a holistic and life-cycle approach and thus included all items impacting on immediate children's standard of living and/or having an indirect or future impact on their well-being – i.e., children's items per se as well as household items which affect children's lives.

We carried out a systematic item by item analysis at both EU and country levels which ensured a robust selection of items, by using four criteria to select the final optimal lists of MD items:

1. The *suitability* of the items, in order to check that citizens in the different Member States (as well as the different population sub-groups within each Member State) consider these items necessary for people to have an 'acceptable' standard of living in the country where they live. We showed that most items are 'wanted' by a very large majority of the population, at both EU and national levels. Even for the more 'problematic' items/countries, the proportion of people 'wanting' the item is not lower than 60 %. This provides evidence in support of the use of a same set of items to analyse MD in the EU.
2. The *validity* of individual items, to ensure that each item exhibits statistically significant relative risk ratios with three independent variables known to be correlated with MD (At-risk-of-poverty, Subjective poverty and Self-reported health status). We considered that an item had validity problems if the results of the logistic regressions were not significant in two out of the three validity tests. We rejected an item as 'invalid' if it had validity problems in more than two out of 26 Member States (Sweden not being included because of the large proportion of missing cases for all module items). For the whole population, two items had to be rejected on invalidity ground (Colour TV and Telephone) and, for the child population, 13 items had to be rejected (Three meals a day, Dentist consultation when needed, GP consultation when needed, Basic housing amenities, Noise, Pollution, Crime, Litter lying around, Telephone, Colour TV, Washing machine, Access to public transport, Access to postal and banking services).
3. The *reliability* of the MD scale, to assess the internal consistency of the scale as a whole - i.e., how closely related the set of MD items are as a group. This analysis was based on the Cronbach's alpha and a *Classical Test Theory (CTT)* framework. In line with our validity tests, an item was considered unreliable if it was unreliable in three countries or more. For the whole population, 14 items failed our reliability test: Colour TV, Telephone, Washing machine, Basic amenities, Problems of accessibility, all the items

related to local environment problems and some of the items related to housing (overcrowding, dark dwelling and high housing costs). For the child population, four additional children items did not pass the test (Three meals a day, Availability of outdoor space to play safely, Dentist consultation when needed and GP consultation when needed). Two items that were reliable for the 0+ age range were not reliable for the 1-15 (Shortage of space and Leaking roof). The reverse was true for Overcrowding which passed the test for the child population but not for the whole population. Tables 5 and 6 summarise the suitability, validity and CTT tests and present the results at both the EU and country levels.

The CCT reliability analysis was complemented with additional analysis on the reliability of each individual item in the scale using *Item Response Theory (IRT)* for each of the MD items that were not excluded on the basis of the validity and Cronbach's alpha tests (but including some housing items that were borderline). For both the 0+ and child populations, the IRT analyses were carried out for the EU as a whole as well as separately for each of the 27 EU countries. The results provided evidence that the housing items should be excluded from the MD indicators.

As a result of the CCT and IRT tests, 13 items (for the whole population) and 19 items (for the child population) were retained.

4. The *additivity* of items, to test that the MD indicator's components add up (e.g. that those with a MD indicator score of '2' are indeed suffering from more severe MD than those with a score of '1'). This was analysed for the items that had successfully passed the suitability, validity and reliability (CCT plus IRT) tests – i.e. for the 13 (19) items retained for the 0+ (1-15) populations. The additivity analysis was carried out for the EU as a whole as well as separately for each of the 27 EU countries. All 0+ MD items passed the additivity tests whereas one children's item (difficulties to face unexpected expenses) failed and was therefore dropped from the final list.

As a result of these four tests, the 13 (18) items retained for the whole (children) populations can be said to be suitable, valid, reliable and additive measures of MD in all EU countries. The very high level of reliability of these two lists needs to be highlighted. Classical Test Theory assumes that there are an infinite (or very large) number of MD measures. If we could have answers to this infinite number of deprivation questions then we would have 'perfect knowledge' (we would know everything) about each person's deprivation. No set of weights could add any additional information as we would already know everything i.e. the infinite deprivation index is self-weighting. The square root of the Cronbach's alpha statistic can be considered to be the correlation between the index and the 'perfect' index made from the answers to the infinite set of deprivation questions. The Cronbach's alpha for the whole population list is 0.85, and for the child list it is 0.90. The correlations with the perfect infinite set of deprivation indicators are therefore impressive (respectively, 0.92 and 0.95), so there is little additional information that any differential weights could add. Even if perfect error free differential weights could be developed the results from the current deprivation indicator and the weighted indicator would be essentially identical. In view of these results and because of the advantages of this approach (in particular, its simplicity and transparency), an equal weighting approach seems to be well suited for the construction of EU material deprivation indicators.

In view of the careful and systematic analytical framework used to identify the items to be included in our proposed MD indicators, we are confident that these items (and related aggregate indicators) are robust and statistically validated and that they capture the essence of the problem - a requirement for EU social indicators used for monitoring purposes at EU and national levels in the context of EU cooperation in the social field (Social Open Method of Coordination as well as Europe 2020).

The final list of items retained for our proposed MD indicator(s) related to the whole population (0+) consists therefore of 13 items:

a) Personal items: The person cannot afford (but would like to have, i.e. a lack is an 'enforced lack' and does not simply reflect a choice):
   1. To replace worn-out clothes by some new (not second-hand) ones
   2. Two pairs of properly fitting shoes, including a pair of all-weather shoes
   3. To spend a small amount of money each week on oneself without having to consult anyone
   4. To have regular leisure activities
   5. To get together with friends/family for a drink/meal at least monthly

b) 'Household items', i.e. items collected at household level (population: whole population living in private households). The household cannot afford:
   6. To replace worn-out furniture
   7. A meal with meat, chicken, fish or vegetarian equivalent every second day
   8. To face unexpected expenses
   9. One week annual holiday away from home
   10. To avoid arrears (mortgage or rent, utility bills or hire purchase instalments)
   11. A computer and an Internet connection (enforced lack, i.e. cannot afford but would like to have)
   12. To keep home adequately warm (enforced lack)
   13. A car/van for private use (enforced lack)

As an illustration, if we set the threshold at 5+ lacked items (out of 13), the proportion of materially deprived people in the EU as a whole (EU-27 weighted average) is 17.7 % in 2009, a percentage that is close to the current EU indicator of 'standard' MD (3+ lacked items out of nine) which is 17.1 %. A threshold of 7+ items lacked (out of 13) leads to a MD rate for the EU as a whole that is slightly higher than the current EU indicator of 'severe' MD (4+ lacked items out of nine): 9.2 % as opposed to 8.1 %.

The final list of items retained in our proposed MD indicator related to the children (1-15) population consists of 18 items:

a) 'Children's items', i.e. items specifically focused on children (these items are collected at household level). The household cannot afford for at least one child to have (enforced lack):
   1. Some new (not second-hand) clothes
   2. Two pairs of properly fitting shoes, including a pair of all-weather shoes
   3. Fresh fruits & vegetables daily
   4. One meal with meat, chicken, fish or vegetarian equivalent daily
   5. Books at home suitable for the children's age
   6. Outdoor leisure equipment
   7. Indoor games
   8. A suitable place to do homework
   9. Regular leisure activities (sports, youth organisations, etc.)
   10. Celebrations on special occasions
   11. To invite friends round to play and eat from time to time
   12. To participate in school trips and school events that costs money
   13. One week annual holiday away from home

b) 'Household items', i.e. items collected at household level (population: whole population living in private households). The household cannot afford:
   14. To replace worn-out furniture
   15. To avoid arrears (mortgage or rent, utility bills or hire purchase instalments)
   16. A computer and an Internet connection (enforced lack, i.e. cannot afford but would like to have)
   17. To keep home adequately warm (enforced lack)
   18. A car/van for private use (enforced lack)

As an illustration, a threshold of 3+ items lacked (out of 18) leads to an EU-27 child MD rate of 21.2 %, a figure that is close to the current EU 'standard' MD rate (19.5 %) and to the proportion of children living in deprived households according to our proposed whole population indicator (lacking 5+ items from the 13-item whole population scale (20.9 %)). A threshold of 6+ items lacked (out of 18) leads to an EU-27 child MD rate of 9.4 %, a figure quite close to the current EU 'severe' MD indicator computed for the population aged 1-15 (9.2 %) and also close to the proportion of children living in deprived households according to our proposed whole population indicator (lacking 7+ items from the 13-item whole population scale (11.2 %)). Because the data they are based on were collected only once (in 2009), we have not been able to assess how our proposed indicators evolve over time. The suggested whole population indicator(s) would require the collection of seven additional variables in EU-SILC (see Section 12.2). Should these data be collected in the 2013 wave of EU-SILC and be made available in the second half of 2014, this should then allow for additional change over time analysis to be finalised by early 2015 - i.e., in time for the mid-term review of the Europe 2020 Strategy which will include a review of the EU headline target on social inclusion and the way it is measured (Section 1). We also hope that the deprivation data needed to compute our suggested children indicator will be collected in 2013 and/or 2014, so that change over time analyses can be undertaken on this indicator as well.

It is important to ensure that the items on which the whole population and the children MD indicators are based accurately capture living patterns and expectations. Thus, the selected items will have to be checked regularly and, when needed, amended or replaced in line with societal changes. It is also important to stress that even though the four service deprivation items (two related to access to health care, one to public transport and one to postal/banking services) were not retained in our proposed MD indicators, on validity and/or reliability grounds, these are obviously essential aspects of adults' and children's current and future well-being. Access to affordable, high quality services is essential for eliminating poverty and deprivation in the EU. Therefore, we recommend the development of a 'services' module for EU-SILC designed to measure the adequacy of services, their availability and financial barriers to access. An example from the UK of a service access module is shown in Annex 9.

To conclude, this work aims to help advance the 'state of the art' of poverty and deprivation measurement in the EU. Our analyses have demonstrated the success of the 2009 EU-SILC module in collecting new deprivation measures for both adults and children. By using a rigorous theory based analytical framework for developing suitable, reliable, valid and additive deprivation indices, we have shown how optimal sub-sets of the 50 available indicators of deprivation can be identified for different population groups. A broad range of statistical techniques have demonstrated that our proposed 13-item whole population MD indicator(s) and 18-item child MD indicator produce more accurate and precise measurements of deprivation than the current EU MD indicator.

References

Accardo, J. and de Saint Pol, T. (2009). 'Qu'est-ce qu'être pauvre aujourd'hui en Europe? L'analyse du consensus sur les privations', Economie et statistique, Volume 421, No 421, pp. 3-27.

Atkinson, T., Cantillon, B., Marlier, E. and Nolan, B. (2002). 'Social Indicators: The EU and Social Inclusion', Oxford: Oxford University Press.

Atkinson, A.B. and Marlier, E. (eds.) (2010). 'Income and living conditions in Europe', Luxembourg: Publications office of the European Union, available at: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-31-10-555/EN/KS-31-10-555-EN.PDF.

Atkinson, A.B. and Marlier, E. (2010). 'Analysing and Measuring Social Inclusion in a Global Context', New-York: United Nations, available at: http://www.un.org/esa/socdev/publications/measuring-social-inclusion.pdf.

Atkinson, A.B. and Marlier, E. (2011). 'Human Development and Indicators of Poverty and Social Exclusion as Part of the Policy Process', Indian Journal of Human Development, Volume 5, No 2, pp. 293-320.

Berthoud, R., Bryan, M. and Bardasi, E. (2004). 'The dynamics of deprivation: the relationship between income and material deprivation over time', Department for Work and Pensions, Research Report No 219.

Bradshaw, J. and Finch, N. (2003). 'Overlaps in Dimensions of Poverty', Journal of Social Policy, Volume 32, No 4, pp. 513-525.

Cappellari, L. and S.P. Jenkins (2007). 'Summarizing Multiple Deprivation Indicators'. In: Jenkins, S.P, Micklewright, J. (eds.) Inequality and Poverty: Re-examined, Oxford: Oxford University Press, pp. 166-184.

Commission on Social Determinants of Health (2008). 'Final Report: Closing the gap in a generation: Health equity through action on the social determinants of health', Geneva: WHO.

Council of the European Union (1975). Council Decision of 22 July 1975 Concerning a Programme of Pilot Schemes and Studies to Combat Poverty', 75/458/EEC, OJEC, L 199, Brussels.

Council of the European Union (1985). 'Council Decision of 19 December 1984 on Specific Community Action to Combat Poverty', 85/8/EEC, OJEC, L 2, Brussels.

Council of the European Union (2010). 'Press Release; 3019th Council meeting; Employment, Social Policy, Health and Consumer Affairs; Luxembourg, 7 and 8 June 2010', Document 10560/10, Brussels: Council of the European Union, available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/115003.pdf.

Daly, M (1989). 'Women and Poverty', Dublin: Attic Press Ltd in conjunction with Combat Poverty Agency.

Dekkers, G. (2008). 'Are you unhappy? Then you are poor! Multi-dimensional poverty in Belgium', International Journal of Sociology and Social Policy, 28, 11/12, pp. 502-515.

de Neubourg, C., Bradshaw, J., Chzhen, Y., Main, G., Martorano, B. and Menchini, L. (2012). 'Child deprivation, multidimensional poverty and monetary poverty in Europe', UNICEF Innocenti Working Paper 2012/02, Background paper 2 for UNICEF Innocenti Report Card 10.

Dickes, P. (1989). 'Pauvreté et Conditions d'Existence. Théories, modèles et mesures', Document PSELL, No. 8, Walferdange: CEPS/INSTEAD.

Dickes P., Fusco, A. and Marlier, E. (2010). 'Structure of national perceptions of social needs across EU countries', Social Indicators Research, 2010. vol. 95, No. 1, pp.143-67.

European Commission (2009). 'Portfolio of indicators for the monitoring of the European strategy for social protection and social inclusion. 2009 update', available from: http://ec.europa.eu/social/main.jsp?catId=756&langId=en.

European Council (2010). 'European Council 17 June 2010: Conclusions', Brussels: European Council, available at: http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/115346.pdf.

Eurostat (2002). 'Income, Poverty and Social Exclusion: Second Report', Luxembourg: OPOCE.

Eurostat (2011). '2009 EU-SILC Module on material deprivation. Assessment of the implementation', ESTAT F3/AR D(2011).

Everitt, B.S., Landau, S. and Leese, M. (2001). 'Cluster analysis', 4th Edition, London: Matthew Arnold.

Fusco, A. and Dickes, P. (2008). 'The Rasch model and multidimensional poverty measurement'. In: Kakwani Nanak, Silber Jacques (eds.). Quantitative Approaches To Multidimensional Poverty Measurement. Houndmills: Palgrave Macmillan, Chapter 3 (pp.49-62).

Fusco, A., Guio, A.-C. and Marlier, E (2010). 'Characterising the income poor and the materially deprived in European countries'. In: Atkinson A.B. and Marlier E. (eds.), Income and living conditions in Europe, Luxembourg: Publications office of the European Union, pp. 133-153.

Gábos, A., Özdemir, E. and Ward, T. (2011). 'Material deprivation among children', Social Situation Observatory, Income distribution and living conditions, Research note No. 7/2011 prepared for the European Commission.

Ghiselli, E.E., Campbell, J.P. and Zedek, S. (1981). 'Measurement theory for the behavioral sciences', San Francisco: W.H. Freeman and Company.

Glendinning, C and Millar, J (eds.) (1992). 'Women and Poverty in Britain in the 1990's', Hemel Hempstead: Harvester Wheatsheaf.

Gordon, D. (2006). 'The concept and measurement of poverty'. In Pantazis, C., Gordon, D. and Levitas, R. (eds.) 'Poverty and Social Exclusion in Britain: The Millennium Survey', Bristol: The Policy Press.

Gordon, D., Adelman, A., Ashworth, K., Bradshaw, J., Levitas, R., Middleton, S., Pantazis, C., Patsios, D., Payne, S., Townsend, P. and Williams, J. (2000). 'Poverty and social exclusion in Britain', York: Joseph Rowntree Foundation.

Gordon, D., Davey Smith, G., Dorling, D. and Shaw, M. (eds.) (1999). 'Inequalities in Health: The evidence presented to the Independent Inquiry into Inequalities in Health'. Bristol: The Policy Press.

Gordon, D., Nandy, S., Pantazis, C., Pemberton, S. and Townsend, P. (2003). 'Child Poverty in the Developing World', Bristol: The Policy Press.

Gordon, D. and Pantazis, C. (eds.) (1997). 'Breadline Britain in the 1990s', Aldershot: Ashgate.

Guio, A.-C. (2009). 'What can be learned from deprivation indicators in Europe?', Eurostat methodologies and working paper, Luxembourg: Eurostat, available from: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-09-007/EN/KS-RA-09-007-EN.PDF.

Guio, A.-C., Fusco, A. and Marlier E. (2009). 'A European Union Approach to Material Deprivation using EU-SILC and Euro-barometer data', IRISS WP 2009-19, December 2009.

Halleröd, B. (1995). 'The truly poor: direct and indirect measurement of consensual poverty in Sweden', Journal of European Social Policy, Vol. 5, No. 2, pp. 111-129.

Halleröd, B. (2006). 'Sour Grapes: Relative Deprivation, Adaptive Preferences and the Measurement of Poverty', Journal of Social Policy, Vol. 35, No. 3, Cambridge University Press, pp. 371-390.

Jensen, J., Spittal, M., Crichton, S., Sathiyandra, S. and Krishnan, V. (2002). 'Direct measurement of living standards: the New Zealand ELSI scale', Ministry of Social Development, Wellington.

Kirisci, L., Hsu, T.C. and Yu, L. (2001). 'Robustness of Item Parameter Estimation Programs to Assumptions of Unidimensionality and Normality'. Applied Psychological Measurement, 25, pp. 146-162.

Kline, T.J.B. (2005). 'Psychological Testing: A Practical Approach to Design and Evaluation', London: Sage.

Legard, R., Gray, M. and Blake, M. (2008). 'Cognitive testing: older people and the FRS material deprivation questions', Department for work and pensions, Working paper 55.

Leon, D. and Walt, G. (2001). 'Poverty, Inequality and Health: an international perspective.' Oxford: Oxford University Press.

Long, J.S. and Freese, J. (2006). 'Regression Models for Categorical Dependent Variables using Stata', 2nd Edition, Stata Press.

Mack, J. and Lansley, S. (1985). 'Poor Britain', London: George Allen & Unwin.

Marlier, E., Atkinson, A.B., Cantillon, B. and Nolan, B. (2007). 'The EU and social inclusion: Facing the challenges', Bristol: The Policy Press.

Marlier, E., Cantillon, B., Nolan, B., Van den Bosch, K. and Van Rie, T. (2012). 'Developing and Learning from EU Measures of Social Inclusion', in D.J. Besharov and K.A. Couch (eds.), Counting the poor. New Thinking about European Poverty Measures and Lessons for the United States, International Policy Exchange Series, New York: Oxford University Press.

Marlier, E. and Natali, D. (eds.), with Van Dam, R. (2010). 'Europe 2020: Towards a more Social EU?', Brussels: P.I.E. Peter Lang.

Marsh, A., Gordon, D., Pantazis, C. and Heslop, P. (1999). 'Home, sweet home? The impact of poor housing on health'. Bristol, The Policy Press.

Marsh, A., Gordon, D., Pantazis, C. and Heslop, P. (2000). 'Housing Deprivation and health: A Longitudinal Analysis', Housing Studies, Volume 15, No. 3, pp. 411-428.

Martini, M.C. and Vanin, C. (2010). 'A Measure of Poverty Based on the Rasch Model', available at:
http://homes.stat.unipd.it/mgri/SIS2010/Program/contributedpaper/792-1494-1-DR.pdf.

McKay, S. and S. Collard (2003). 'Developing survey deprivation for the family resources survey', DWP Working Paper Series, No. 13, London: Department for Work and Pensions.

Mojena, R. (1977). 'Hierarchical grouping methods and stopping rules: an evaluation', Computer Journal, No. 20, pp. 359–363.

Mojena, R. and Wishart, D. (1980). 'Stopping rules for Ward's clustering method'. In Barritt, M.M. & Wishart, D. (eds.) COMPSTAT 1980: Proceedings in Computational Statistics, Physica-Verlag, Wien, pp. 426–432.

Milligan, G.W. & Cooper, M.C. (1985). 'An examination of procedures for determining the number of clusters in a data set', Psychometrika, No 50, pp. 159–179.

Nolan, B. and Whelan, C.T. (2011), 'Poverty and Deprivation in Europe', Oxford: Oxford University Press.

Nunally, J. C. (1978). 'Psychometric theory (2nd ed.)', New York: McGraw-Hill.

Nunally, J.C. and Bernstein, I.H. (1994). 'Psychometric Theory' (3rd ed.), New-York: McGraw-Hill.

Observatoire de l'Enfance, de la Jeunesse et de l'Aide à la jeunesse & Sonecom, (2010). 'Recherche qualitative participative sur le vécu des enfants vivant dans la pauvreté de trente enfants âgés de 6 à 12 ans en Communauté française'.

Osterlind, S. and Everson, H. (2009). 'Differential Item Functioning', California: Sage Publications Inc.

Pantazis, C., Townsend, P. and Gordon, D. (2006). 'The necessities of life', in Pantazis, C., Gordon, D. and Levitas, R. (eds.), 'Poverty and Social Exclusion in Britain. The Millennium Survey', Bristol: The Policy Press, Chapter 4, pp. 89-122.

Perry, B. (2002). 'The mismatch between income measures and direct outcome measures of poverty', Centre for Social Research and Evaluation, Ministry of Social Development, New Zealand.

Piachaud, D. (1981). 'Peter Townsend and the Holy Grail', New Society 10, September.

Power, C., Manor, O., and J. Fox. (1991). 'Health and Class: The Early Years'. London: Chapman and Hall.

Power, C., Matthews, S. and Manor, O. (1996). 'Inequalities in self-rated health in the 1958 birth cohort: life time social circumstances or social mobility?', British Medical Journal, No 313, pp. 449-53.

Raileanu Szeles, M., Fusco, A., (2011). 'Item Response Theory and the measurement of deprivation: evidence from Luxembourg data', Quality & Quantity, published online first, 4th October.

Ridge, T., (2002). 'Childhood Poverty and Social Exclusion: From a Child's Perspective', Bristol: The Policy Press.

Ridge, T. (2011). 'The everyday costs of poverty in childhood: a review of qualitative research exploring the lives and experiences of low-income children in the UK', Children & Society, 25 (1), pp. 73-84.

Sen, A. K. (1985). 'The standard of living: The Tanner lectures', Cambridge: Cambridge University Press.

Sen, A. (2009). 'The idea of Justice', Cambridge, Mass.: Belknap Press of Harvard University Press.

Shaw, M., Dorling, D., Gordon, D. and Davey Smith, G. (1999). 'The Widening Gap: health Inequalities and Policy in Britain'. Bristol: The Policy Press.

Social Protection Committee (2001). 'Report on Indicators in the Field of Poverty and Social Exclusion', Brussels.

TNS (2007). 'Poverty and Social Exclusion. Report on the Special Eurobarometer 279/ Wave 67.1', Brussels.

Townsend, P. (1954). 'Measuring Poverty', British Journal of Sociology, 5(2), pp. 130-137.

Townsend, P. (1962). 'The Meaning of Poverty', British Journal of Sociology, 13(3), pp. 210-227.

Townsend, P. (1979). 'Poverty in the United Kingdom', Hardmonsworth: Penguin Books.

Townsend, P. (1987). 'Deprivation', Journal of Social Policy, 16(2), pp. 125-146.

Townsend, P. (1993). 'The International Analysis of Poverty', London (England): Havester Wheatsheaf.

Van den Bosch, K. (2001). 'Identifying the poor using subjective and consensual measures', Aldershot: Ashgate.

Verma, V. (2007). 'Proposals on the treatment of negative, zero, and extreme values of income', Siena, ISR.

Watson, D., Maître, B. and Whelan, C.T. (2012). 'Understanding Childhood Deprivation in Ireland', Dublin: ESRI and Department of Social Protection.

Whelan, B. (1993). 'Non-monetary indicators of poverty', in Berghman J., Cantillon B. (eds.), 'The European Face of Social Security: Essays in honour of Herman Deleeck', Avebury, pp. 24-42.

Whelan, C.T. (2007). 'Understanding the Implications of Choice of Deprivation Index for Measuring Consistent Poverty in Ireland', The Economic and Social Review, Vol. 38, No. 2, Summer/Autumn, pp. 211–234.

Whelan, C.T. (2012). 'Identifying Childhood Deprivation: How Well Do National Indicators of Poverty and Social Exclusion in Ireland Perform?', The Economic and Social Review, Vol. 43, No. 2, Summer, pp. 251–272.

Whelan, C.T., Layte, R., Maître, B. and Nolan, B. (2001). 'Income, deprivation and economic strain. An analysis of the ECHP', European sociological review, Vol. 17 No. 4, pp. 357-372.

Whelan, C.T., Nolan, B. and Maître, B. (2008). 'Measuring material deprivation in an enlarged EU', ESRI Working Paper No. 249.

Wilkinson, R.G. (ed.) (1986). 'Class and Health: Research and Longitudinal Data', London: Tavistock Publications.

Wilkinson, R.G. (1999). 'Health, hierarchy, and social anxiety'. In: Socioeconomic Status and Health in Industrial Nations, N.E. Adler, M. Marmot, B.S. McEwen and J. Stewart (eds.), Annals of the New York Academy of Sciences, Vol. 896, pp. 48-63, New York: The New York Academy of Sciences.

Wishart, D, (2005). 'Number of Clusters'. In Everitt, B S, and Howell, D C (eds.) Encylopedia of Statistics in Behavioral Science, Wiley, Chichester, Vol. 3 , pp. 1442-1446.

Annex 1: Missing values of deprivation items in the 2009 module

The analysis of missing values (in the attached file) uses the Stata code written by Long and Freese (2006), 'misschk'. It provides information on:

- the number of observations which have no missing values, one variable missing, two... etc.;
- the percentage of cases missing for each variable;
- the patterns of missing data among the variables (i.e., do missing values on one variable tend to occur when there are missing values for some other variables?).

The analysis of missing values was performed on the whole population (aged 0+) and on children (aged 1-15).

The adult items are aggregated at the household level (i.e. adult info is kept at the adult level and aggregated at the household level, to be distributed only to children and to non-household respondents in register countries). This means that people with missing information in the analysis below live in households where no adult replied to the question.

The analysis was performed at EU level and at country level. Only problematic cases are discussed.

For the **whole population** (household and adult items), the main results of our analysis are as follows:

a) At EU-level, 98 % of people have non-missing values for the 2009 MD module items. Missing values are mainly concentrated among people with only one missing variable - 0.87 % (mainly people with missing information on household worn-out furniture or access to Internet) and among people with 7 missing values - 0.69 % (all adult items are missing for all adults in the household). The majority of countries have less than 1 % of missing values (see Table A1). Some Member States are however problematic: DE, MT, SE and UK. In Belgium, 2 % of the population have missing information on the availability of hot running water. In Germany, most of the people with at least one missing item lack one, two, three or four items (mainly car, computer, unexpected expenses or one of the adult items). In Malta, most of the problematic cases have 9 missing items, i.e. all the adult items, Internet and worn-out furniture. In the UK, most of the problematic cases miss all 6 adult items. In Sweden, the 2009 module was not collected for 25 % of the sample, furthermore there are lots of additional missing values - in total, 40 % of the sample lack at least one item. Almost 13 % lack only one item (Internet or furniture), 22 % of the population lack all adult items, and most of the remaining cases miss all adult items, plus one additional item (furniture in most cases).

b) For the countries in which the proportion of missing values exceeded 2 %, we have checked whether missing values are randomly distributed on the income/deprivation scales and age groups, by running logit regressions. The relation between missing values and income or deprivation is significant in most of the 'problematic' countries. For future data collection, it will be crucial to identify best ways of avoiding high proportions of missing values for deprivation items along the income scale. Exchange of good practices in this field may be worth considering.

c) The question of the possible imputation of the missing 2009 data needed for the MD indicator will also have to be addressed at some point. If imputation is carried out, it should be country specific as the pattern of missing values and their concentration vary between countries.

d) The current treatment of missing values for those items included in the core part of EU-SILC that are used in the EU MD indicator should also be reviewed (in the current version of the indicator, each person with at least one missing item is considered 'not deprived').

e) The question of the possible imputation of the missing 2009 data needed for the MD indicator will also have to be addressed at some point. If imputation is carried out, it should be country specific as the pattern of missing values and their concentration vary between countries.

f) The current treatment of missing values for those items included in the core part of EU-SILC that are used in the EU MD indicator should also be reviewed (in the current version of the indicator, each person with at least one missing item is considered 'not deprived').

g) The question of the possible imputation of the missing 2009 data needed for the MD indicator will also have to be addressed at some point. If imputation is carried out, it should be country specific as the pattern of missing values and their concentration vary between countries.

h) The current treatment of missing values for those items included in the core part of EU-SILC that are used in the EU MD indicator should also be reviewed (in the current version of the indicator, each person with at least one missing item is considered 'not deprived').

Table A1: Proportion of people by number of missing items, whole sample, 2009, (%)

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
BE	97.2	2.8																
BG	100.0																	
CZ	100.0	0.0																
DK	99.0		0.1			0.1	0.0											
DE	97.0	1.9	0.5	0.2	0.2	0.1	0.1	0.0	0.0	0.0								
EE	100.0	0.1																
IE	99.6	0.4	0.0															
EL	100.0																	
ES	99.9	0.0	0.0	0.0														
FR	98.8	1.1	0.1	0.0	0.0	0.0	0.0											
FI	100.0																	
IT	100.0																	
CY	100.0																	
LV	100.0																	
LT	100.0																	
LU	98.8	1.1	0.1															
HU	99.9	0.0			0.1	0.0												
MT	97.5	0.3	0.1		0.0		0.0		0.0	1.9	0.0						0.0	
NL	99.0	0.8	0.1	0.0	0.1													
AT	99.7	0.3	0.0	0.0														
PL	100.0																	
PT	98.7	1.1	0.1	0.1	0.0	0.0		0.0		0.0								
RO	100.0																	
SI	100.0																	
SK	99.8	0.2	0.0	0.0														
SE	**60.1**	**12.8**	**1.6**	**0.2**	**0.1**	**0.0**	**0.1**	**21.6**	**3.3**	**0.1**	**0.0**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**		
UK	97.9	0.2		0.0	0.1		1.7				0.0			0.0			0.1	

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

For the **child population**, the analysis of missing values (children's items) shows the following (see Table A2):

a) There is a majority of countries with few missing values (note: people with no children attending school who did not reply to the two items asked only about children attending school (homework and school trips) are considered 'not deprived').

b) In some countries (mainly Bulgaria), the children's items are flagged as 'not applicable' because the household was considered as not having any child aged between 1 and 15, although there were children in this age group in the household. The information was therefore not collected for these children and is missing. This problem arose for five children's items in Bulgaria for 28 % of (eligible) children.

c) Most of the other missing cases are concentrated on children with missing information for 11 items (especially in IE, AT, ES, LU). Sweden is very problematic with 44 % of missing values (33 %, with all the children's items missing).

For the countries in which the proportion of missing exceeds 2 %, we have checked whether missing values are randomly distributed on the income/deprivation scales, by running logit regressions. Dependent variables are missing shoes item, missing friends item, missing homework item and the number of children's items missed. Except in SE, BG, AT and ES for some items, the relation between income/deprivation and the probability to find missing information is not significant.

Table A2: Proportion of children, by number of missing children's items, sample of children aged 1-15, 2009, (%)

	0	1	2	3	4	5	6	7	8	10	11	12	13
BE	99.7	0.1									0,1		0.2
BG	72,.3					27.7					0.1		
CZ	100.0												
DK	93.3		4.1								2.5		0.1
DE	98.2	0.9	0.1		0.1						0.7	0.1	0.1
EE	95.1		4.9										
IE	92.8	0.1	0.6								6.5		0.1
EL	100.0												
ES	96.2	0.2	0.1	0.0	2.5	0.0	0.8	0.0			0.1		0.0
FR	99.8	0.2	0.0										
IT	100.0												
CY	100.0												
LV	99.8												0.2
LT	99.4	0.1	0.1	0.1	0.2						0.1		
LU	97.0	0.8	0.6								1.4		0.2
HU	93.3	4.6	1.4	0.4	0.1	0.2					0.1		
MT	96.6										2.2		1.2
NL	97.9	0.6	0.1								1.4		
AT	96.6	0.3	0.0								2.2		0.9
PL	100.0												
PT	97.5	1.0	1.6										
RO	100.0												
SI	99.1										0.1		
SK	96.9	1.1	1.0	0.1	0.1						0.7		0.2
FI	99.4	0.3	0.0	0.0	0.0		0.0	0.0			0.0		0.2
SE	56.2	0.6	10.4	0.1	0.1								32.6
UK	94.4	3.8									1.64		0.3

Notes: children living in households with no children attending school who did not reply to the two items asked only about children attending school (homework and school trips), i.e. with flags -4 or -2, are considered as 'not deprived'.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Annex 2: Cross-tabulation of computer and Internet

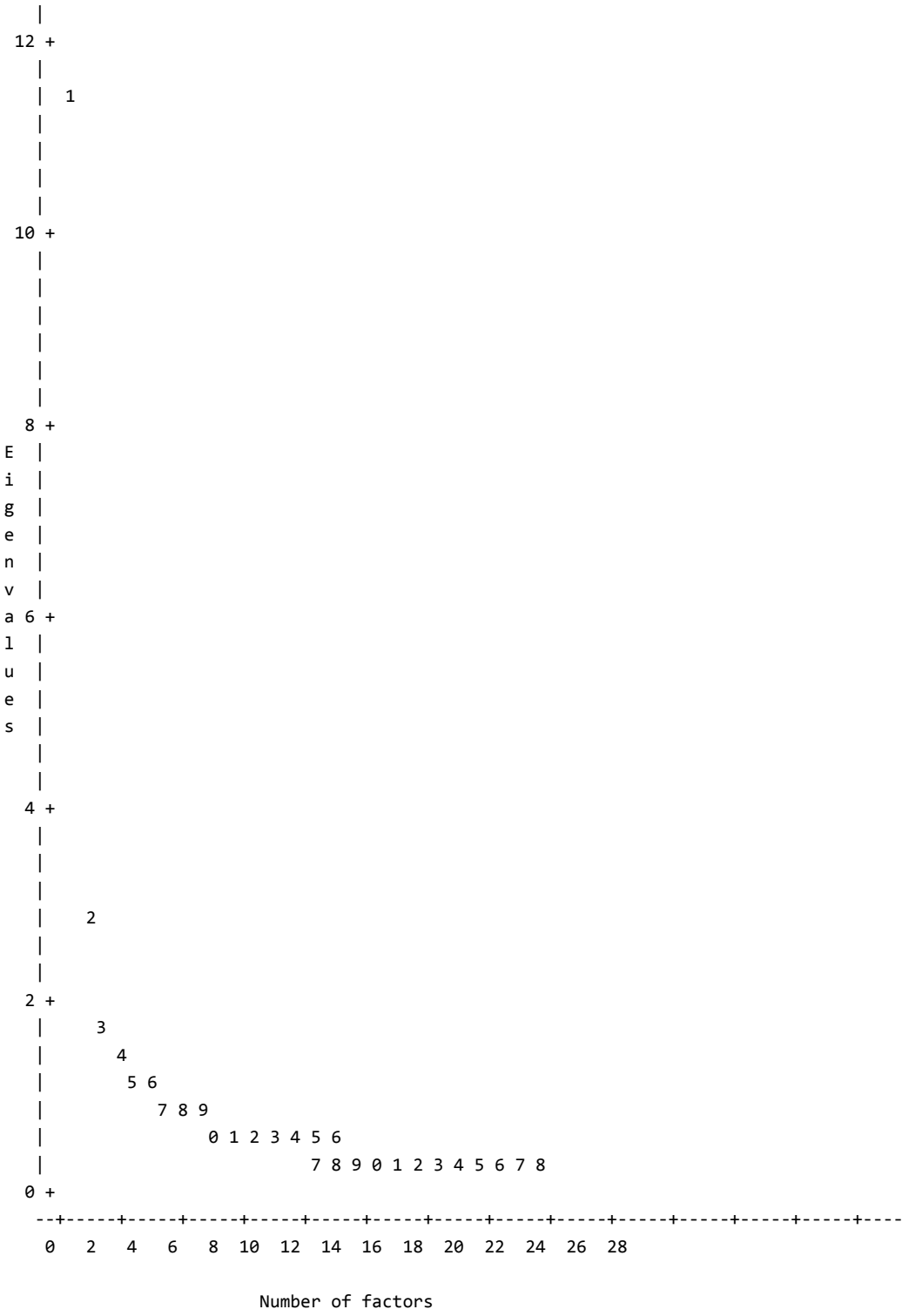
Table A3: People lacking a computer and/or access to Internet, whole population, 2009, (%)

	Have computer 'only'	Have Internet 'only'	Have computer and Internet	Lack computer and Internet
BE	1.5	0.1	93.8	4.6
BG	2.6	3.3	70.9	23.2
CZ	1.1	0.5	91.9	6.5
DK	0.3	0.4	97.9	1.4
DE	5.1	0.9	91.8	2.2
EE	1.8	1.4	91.2	5.6
IE	4.8	2.2	89.5	3.5
EL	3.5	0.6	85.1	10.8
ES	7.2	2.6	86.2	4.1
FR	1.8	1.1	93.3	3.8
IT	0	0	95.1	4.9
CY	3.0	2.7	91.9	2.4
LV	2.6	8.5	81.7	7.3
LT	3.1	2.7	85.3	8.8
LU	1.2	0.8	97.3	0.7
HU	7.0	4.7	79.8	8.5
MT	2.7	1.1	95.1	1.1
NL	0.3	0.4	98.5	0.9
AT	1.2	0.4	94.5	3.9
PL	5.7	1.8	82.8	9.6
PT	6.6	2.6	83.3	7.5
RO	8.5	11.3	60.7	19.5
SI	1.5	1.6	93.7	3.2
SK	3.3	0.3	86.8	9.6
FI	0.5	0.9	96.0	2.6
SE	0.2	0	99.8	0
UK	1.9	0.9	94.8	2.4

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Annex 3: Dimensional structure of the full set of items

Figure A1: Factor analysis, Scree plot of 'eigenvalues', whole population, EU-27, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A4: Factor loadings - 4 dimensions, whole population, EU-27, 2009

	Factor1	Factor2	Factor3	Factor4
Adult: Clothes	0.87	0.45	0.14	0.20
Adult: Drink/meal once a month	0.86	0.39	0.11	0.19
Adult: Leisure activity	0.86	0.36	0.16	0.15
Adult: Pocket money	0.85	0.33	0.15	0.17
Household: Holiday	0.84	0.44	0.10	0.22
Household: Furniture	0.80	0.45	0.14	0.13
Household: Unexpected expenses	0.79	0.39	0.16	0.13
Household: Meat, chicken, fish	0.78	0.45	0.12	0.23
Adult: Shoes	0.77	0.41	0.15	0.16
Adult: Mobile	0.75	0.52	-0.06	0.23
Household: Computer & Internet	0.70	0.52	0.05	0.16
Household: Car	0.70	0.57	0.09	0.04
Household: Inadequate warmth	0.69	0.44	0.18	0.17
Household: Arrears	0.60	0.35	0.24	0.08
Household: Telephone	0.70	0.69	-0.06	0.24
Household: Washing machine	0.70	0.75	-0.05	0.18
Household: Basic amenities	0.60	0.70	-0.08	0.31
Household: Colour TV	0.53	0.67	-0.01	0.16
Household: Overcrowding	0.44	0.49	0.19	0.03
Household: Leaky roof, damp etc.	0.32	0.63	0.26	0.17
Household: Shortage of space	0.27	0.53	0.34	-0.07
Household: Too dark	0.22	0.62	0.29	0.09
Household: Vandalism	0.25	0.09	0.76	0.10
Household: Litter	0.22	0.08	0.79	0.08
Household: Crime	0.13	0.18	0.72	-0.05
Household: Pollution	0.11	0.20	0.73	-0.04
Household: Noise	0.09	0.21	0.67	-0.13
Household: High housing cost	0.32	0.05	0.01	-0.15
Household: Difficult access to post/bank	0.16	0.14	-0.01	0.89
Household: Difficult access to public transport	0.15	0.13	-0.06	0.90

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

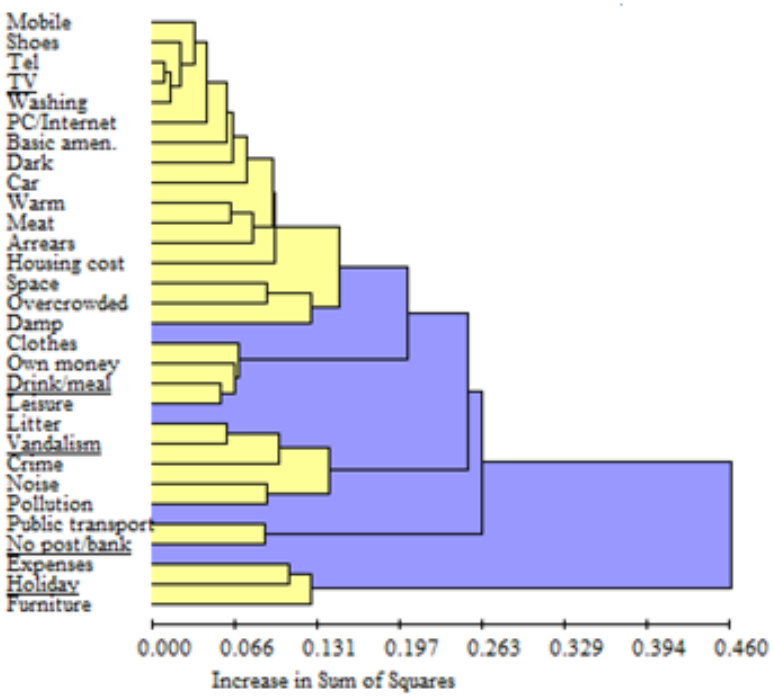
Table A5: Multiple correspondence analysis, point coordinates, whole population, EU-27, 2009

Items	Dim1	Dim2	Dim3	Dim4
Household: TV	2.70	-1.16	6.12	-1.09
Household: Telephone	3.12	-1.58	5.10	-0.96
Household: Washing machine	2.88	-1.25	4.13	-0.88
Adult: Shoes	2.59	-0.49	0.62	-0.51
Adult: Mobile	2.31	-1.00	1.63	-0.50
Household: Computer & Internet	1.92	-0.42	0.59	-0.21
Household: Basic amenities	1.60	-0.55	1.18	0.18
Household: Darkness	0.77	0.76	0.48	0.34
Household: High housing cost	0.51	-0.11	-0.20	-0.45
Household: Home warmth	1.55	-0.03	-0.09	0.01
Household: Car	1.57	-0.17	0.39	-0.37
Household: Meat	1.73	-0.22	-0.09	0.06
Adult: Clothes	1.85	-0.27	-0.21	-0.12
Household: Damaged public amenities	0.57	1.58	0.19	0.17
Household: Arrears	1.16	0.19	-0.39	0.05
Adult: Get-together with friends	1.72	-0.30	-0.33	-0.16
Household: Crime	0.37	1.37	0.30	-0.07
Household: Litter lying around	0.48	1.43	0.13	0.13
Household: Pollution	0.34	1.34	0.29	-0.04
Household: Shortage space	0.63	0.59	-0.05	0.00
Household: Leaking roof	0.70	0.43	0.22	0.34
Adult: Pocket money	1.47	-0.18	-0.49	-0.09
Adult: Leisure	1.48	-0.16	-0.47	-0.11
Household: Access public transport	0.24	-0.24	0.23	1.68
Household: Noise	0.27	1.10	0.22	-0.13
Household: Access to bank/post	0.25	-0.14	0.22	1.51
Household: Overcrowding	0.72	0.22	-0.17	0.05
Household: Furniture	0.94	-0.01	-0.34	0.01
Household: Unexpected expenses	0.80	0.01	-0.40	0.06
Household: Holidays	0.81	-0.05	-0.35	0.12

Notes: Items sorted out according their contribution to the total inertia.

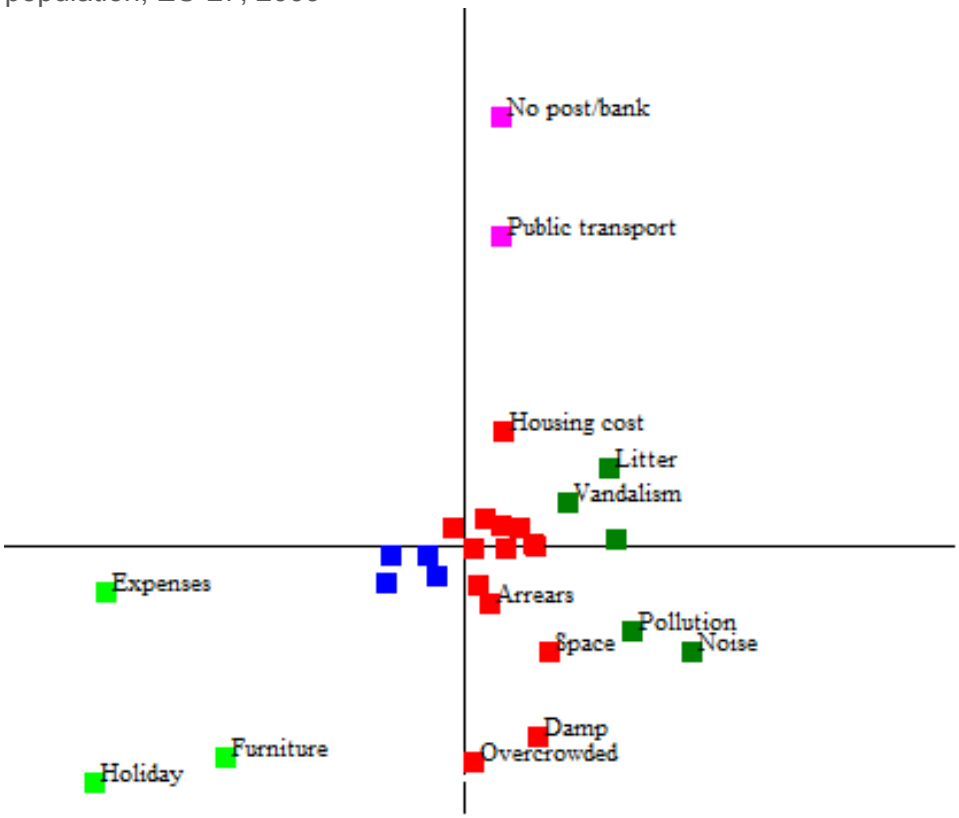
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure A2: Dendrogram of the five whole population clusters, EU-27, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure A3: Multidimensional Scaling (MDS) plot of the cluster results, whole population, EU-27, 2009



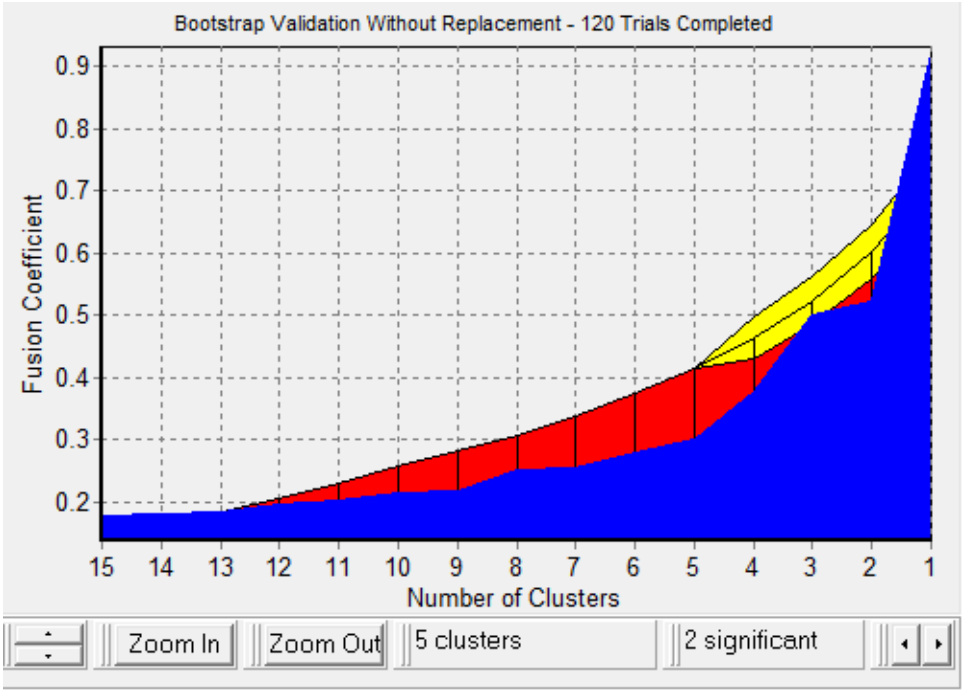
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A6: Optimal number of clusters results (whole population), EU-27, 2009

	Best Cut Significance Test - Upper tail	
Proposed Partition	**Realised Deviate**	**t-Statistic**
2 clusters	3.86	20.80
3 clusters	1.69	9.09
4 clusters	1.57	8.46
5 clusters	**1.05**	**5.66**
6 clusters	0.46	2.48
	Best Cut Significance Test - Moving average	
Proposed Partition	**Realised Deviate**	**t-Statistic**
2 clusters	3.98	21.43
4 clusters	2.42	13.01
5 clusters	**2.31**	**12.44**
3 clusters	1.32	7.10
9 clusters	0.92	4.97
7 clusters	0.68	3.68
6 clusters	**0.60**	**3.25**
8 clusters	0.40	2.13

The 'Best Cut' method (Mojena, 1977) identifies all cluster solutions from 2 to 6 clusters as significant at the 5 % level. The largest increase in the t-statistic and realised deviates is between the 6 and 5 cluster solutions indicating that the 5 cluster solution may be 'optimal'. The 'Moving Average' method also identifies the 5 cluster solution as likely to be optimal (the 9 cluster solution is also 'good'). This method indicates that all cluster solutions between 2 clusters and 9 clusters are significant at the 5 % level.

Figure A4: Bootstrap Validation of the Number of Clusters (whole population), 2009



Notes: The bootstrap validation indicates that the one and two cluster solutions are significant – there is a clear break of slope at the 5 cluster solution indicating that this may be the 'optimal' solution.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A7: Factor loadings - 6 dimensions, child population, EU-27, 2009

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Children: Indoor games	0.92	0.13	0.34	0.45	0.27	0.17
Children: Outdoor	0.92	0.18	0.31	0.44	0.31	0.12
Children: Suitable books	0.89	0.17	0.35	0.54	0.34	0.18
Children: Invite friends	0.87	0.18	0.24	0.47	0.39	0.11
Children: Fresh fruits & veg daily	0.86	0.23	0.33	0.43	0.41	0.18
Children: Leisure activities	0.86	0.15	0.27	0.49	0.36	0.12
Children: Celebrations	0.85	0.16	0.30	0.50	0.36	0.13
Children: Meat, chicken, fish	0.85	0.24	0.35	0.43	0.37	0.17
Children: School trips	0.85	0.13	0.31	0.48	0.32	0.12
Household: Washing machine	0.85	0.14	0.54	0.08	0.33	0.24
Children: Some new clothes	0.83	0.21	0.30	0.44	0.46	0.18
Children: Two pairs of shoes	0.80	0.24	0.32	0.45	0.42	0.13
Household: Basic amenities	0.79	0.12	0.46	0.09	0.18	0.26
Children: Holiday	0.79	0.18	0.20	0.36	0.56	0.11
Household: Car	0.78	0.24	0.36	0.07	0.45	0.04
Household: Telephone	0.77	0.15	0.46	0.05	0.41	0.23
Household: Computer & Internet	0.76	0.12	0.35	0.23	0.47	0.15
Household: Furniture	0.76	0.23	0.27	0.19	0.61	0.05
Children: 3 meals a day	0.75	0.29	0.28	0.53	0.27	0.08
Household: Overcrowding	0.65	0.20	0.23	0.39	0.00	-0.08
Household: Inadequate warmth	0.64	0.21	0.31	0.48	0.52	0.11
Household: Unexpected expenses	0.64	0.21	0.26	0.22	0.82	0.08
Household: Colour TV	0.63	0.31	0.53	0.09	0.30	0.20
Children: Place to do homework	0.61	0.20	0.49	0.60	0.09	0.03
Children: Outdoor space to play	0.28	0.39	0.08	0.57	0.12	0.01
Household: Vandalism	0.26	0.80	0.12	0.17	0.30	0.09
Household: Litter	0.22	0.82	0.13	0.17	0.27	0.05
Household: Crime	0.18	0.75	0.27	0.19	0.13	-0.07
Household: Pollution	0.16	0.73	0.34	0.15	0.01	-0.03
Household: Noise	0.15	0.67	0.38	0.14	0.02	-0.11
Household: Shortage of space	0.40	0.28	0.63	0.31	0.07	-0.08
Household: Leaky roof, damp etc.	0.38	0.24	0.73	0.21	0.30	0.12
Household: Too dark	0.33	0.26	0.77	0.20	0.19	0.09
Children: Unmet medical needs (GP)	0.60	0.17	0.42	0.70	0.39	0.16
Children: Unmet medical needs (dentist)	0.57	0.14	0.35	0.71	0.40	0.15
Household: Arrears	0.51	0.20	0.30	0.36	0.76	0.11
Household: Difficult access to post/bank	0.18	0.03	0.09	0.03	0.07	0.89
Household: High housing costs	0.18	0.02	0.09	0.03	-0.05	0.72
Household: Difficult access to public transport	0.15	-0.07	0.06	0.07	0.06	0.89

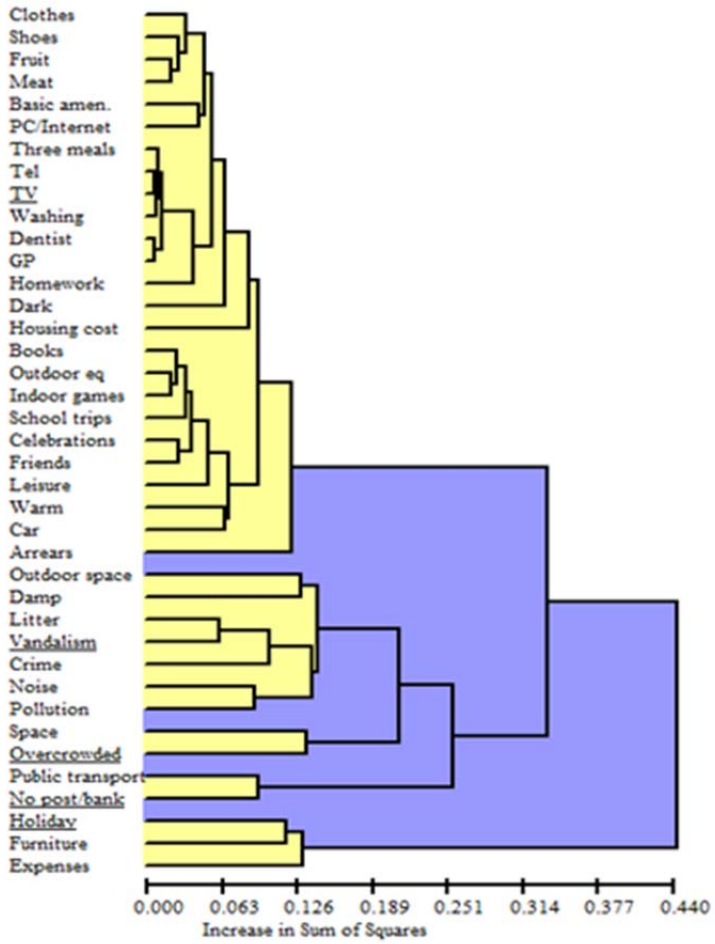
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A8: Multiple correspondence analysis, point coordinates, child population, EU-27, 2009

Items	Dim 1	Dim 2	Dim 3	Dim 4	Dim 5	Dim 6
Household: TV	3.08	-0.34	2.54	1.58	-3.32	5.28
Children: Unmet medical needs	3.05	-0.22	2.85	0.32	5.75	3.14
Household: Telephone	3.32	-1.16	0.89	0.78	-3.15	2.93
Children: 3 meals	3.56	-0.66	2.55	-0.42	1.26	-1.68
Household: Washing machine	3.54	-1.34	1.03	0.86	-3.16	2.96
Children: Unmet dentist needs	2.66	-0.14	2.15	0.18	4.94	2.20
Children: Shoes	2.71	-0.39	0.78	-0.09	0.24	-0.49
Children: Fruits	2.81	-0.50	0.65	0.04	-0.06	-0.68
Children: Meat	2.74	-0.44	0.65	0.02	-0.07	-0.49
Children: Books	2.96	-0.71	0.74	-0.03	0.11	-0.33
Children: Indoor games	3.02	-0.89	0.66	-0.02	-0.43	-0.29
Children: Place for homework	1.78	0.28	0.49	-0.06	0.59	0.73
Household: Computer & Internet	2.06	-0.29	-0.43	-0.02	-0.37	0.40
Children: Celebrations	2.61	-0.51	0.26	-0.15	0.11	-0.47
Household: Basic amenities	2.02	-0.48	0.08	0.50	-1.25	0.63
Children: School trips	2.52	-0.52	0.29	-0.09	-0.01	-0.19
Children: Clothes	2.33	-0.29	0.18	-0.01	0.20	-0.53
Children: Outdoor equipment	2.67	-0.58	0.34	-0.14	-0.39	-0.47
Household: Darkness	0.81	0.89	-0.01	0.31	0.03	1.40
Children: Friends	2.47	-0.44	0.10	-0.20	0.01	-0.64
Household: Inadequate warmth	1.56	0.25	-0.38	-0.10	0.55	-0.01
Household: Car	1.69	0.01	-0.51	-0.23	-0.72	0.28
Household: High housing cost	0.36	0.08	-0.62	-0.49	0.22	0.00
Children: Leisure	1.92	-0.22	-0.21	-0.12	0.05	-0.35
Household: Damaged public amenities	0.53	1.51	0.46	0.27	-0.25	-0.67
Household: Crime	0.36	1.29	0.49	0.02	-0.18	-0.19
Household: Litter lying around	0.43	1.37	0.38	0.19	-0.21	-0.53
Household: Pollution	0.31	1.26	0.50	0.11	-0.24	-0.05
Children: Outdoor space	0.51	0.64	0.05	0.01	0.37	-0.24
Household: Arrears	0.93	0.39	-0.72	-0.08	0.42	0.11
Household: Leaky roof, damp	0.64	0.57	-0.20	0.19	0.08	0.75
Household: Access public transport	0.18	-0.18	-0.31	1.63	0.20	-0.19
Household: Noise	0.28	1.08	0.37	-0.03	-0.20	0.06
Household: Access to bank/post	0.21	-0.06	-0.29	1.50	0.13	-0.19
Household: Shortage space	0.57	0.54	-0.12	-0.08	-0.03	0.58
Children: Holidays	0.93	0.14	-0.66	-0.10	0.12	-0.15
Household: Overcrowding	0.70	0.23	-0.32	-0.03	-0.13	0.22
Household: Furniture	0.77	0.24	-0.67	-0.15	0.03	-0.04
Household: Unexpected expenses	0.57	0.25	-0.67	-0.10	0.14	0.00

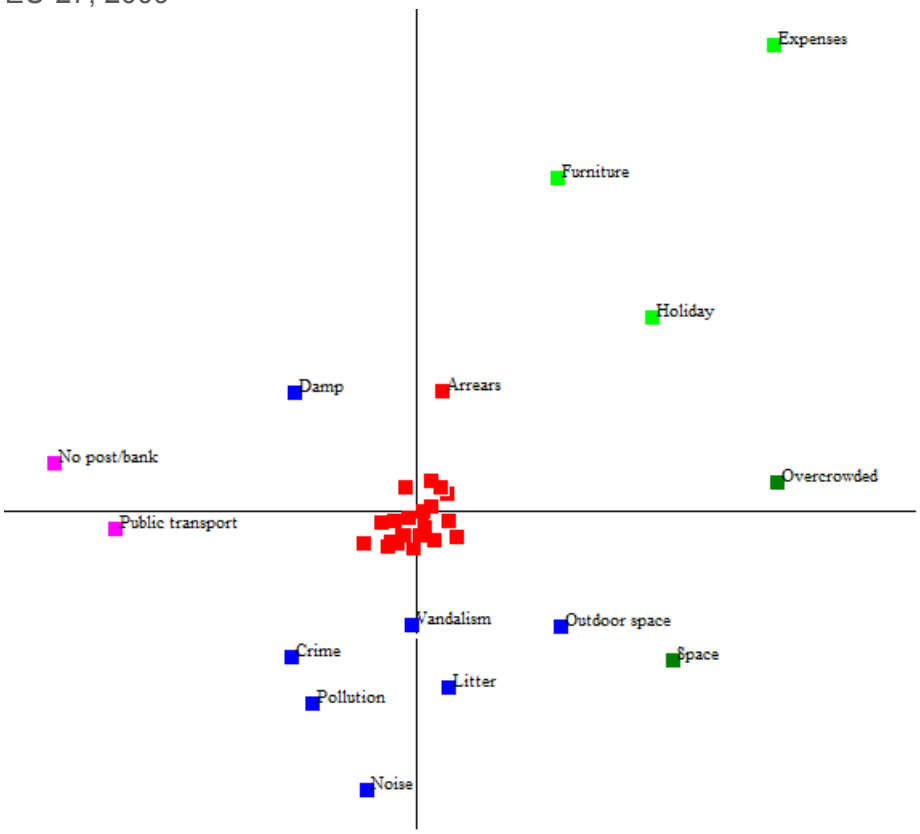
Notes: Items sorted out according their contribution to the total inertia.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure A5: Dendrogram of the five child deprivation clusters, EU-27, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Figure A6: Multidimensional Scaling (MDS) plot of the cluster results, child population, EU-27, 2009



Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Annex 4 (Table A9): Heat map of the 2007 Eurobarometer perception of necessities results (by EU Member States)

	EU27	EU15	NMS12	EL	CY	RO	BG	HU	PT	HR	LV	SK	EE	SI	LU	MT	IE	AT	PL	D-E	FI	UK	DE	FR	D-W	SE	ES	CZ	BE	IT	LT	DK	NL
Medical Care when needed	77%	77%	78%	92%	92%	77%	82%	85%	81%	82%	75%	77%	81%	85%	80%	81%	63%	84%	75%	87%	80%	78%	83%	72%	82%	87%	73%	79%	76%	68%	60%	85%	78%
An indoor flushing toilet for sole use of the household	69%	70%	66%	87%	90%	65%	58%	75%	74%	75%	62%	69%	66%	82%	78%	73%	69%	77%	65%	69%	59%	75%	69%	71%	69%	60%	64%	70%	67%	69%	42%	48%	69%
No leakingroof, damp walls, floors, foundation	68%	68%	67%	81%	74%	76%	74%	54%	69%	71%	71%	70%	78%	75%	68%	68%	68%	75%	65%	80%	75%	72%	74%	69%	73%	78%	56%	64%	69%	62%	55%	61%	62%
Buying medicine when needed	74%	74%	76%	91%	91%	79%	81%	83%	82%	77%	73%	69%	75%	87%	82%	78%	64%	80%	72%	83%	77%	71%	80%	70%	79%	82%	72%	76%	75%	70%	58%	78%	68%
A place to live with hot, running water	67%	67%	65%	86%	82%	74%	51%	73%	74%	72%	55%	68%	52%	81%	71%	62%	62%	80%	62%	63%	60%	71%	66%	74%	67%	65%	59%	64%	62%	64%	41%	49%	59%
A place to live with its own bath or shower	63%	63%	63%	87%	90%	66%	58%	72%	71%	71%	59%	66%	58%	80%	72%	66%	65%	75%	61%	59%	50%	69%	59%	63%	59%	53%	62%	65%	57%	66%	42%	35%	49%
Bed + bedding for everyone	68%	67%	70%	86%	85%	71%	80%	80%	79%	72%	70%	73%	74%	71%	81%	83%	62%	68%	65%	82%	69%	66%	75%	69%	73%	78%	53%	72%	65%	64%	56%	64%	58%
To be able to keep one's home adequately warm	62%	62%	61%	83%	70%	58%	64%	78%	59%	68%	68%	59%	64%	75%	70%	39%	62%	81%	61%	73%	69%	64%	68%	64%	67%	55%	53%	50%	61%	58%	45%	55%	54%
Buying medical equipment when needed	66%	66%	66%	83%	81%	70%	73%	72%	74%	70%	67%	65%	69%	79%	77%	72%	60%	77%	62%	75%	67%	63%	70%	66%	68%	79%	68%	66%	64%	57%	49%	73%	59%
Regular medical and dental checkups	62%	62%	65%	81%	79%	69%	70%	68%	73%	68%	64%	65%	63%	78%	68%	66%	58%	72%	63%	72%	56%	62%	67%	59%	66%	61%	61%	61%	63%	55%	57%	46%	68%	43%
A warm winter coat	65%	63%	71%	88%	67%	80%	84%	77%	71%	70%	61%	76%	73%	63%	79%	32%	64%	71%	68%	69%	73%	58%	68%	66%	67%	71%	60%	63%	61%	56%	46%	64%	45%
A place to live where one doesn't risk being forced to leave	57%	55%	64%	71%	68%	79%	66%	73%	61%	67%	60%	54%	75%	61%	63%	55%	62%	63%	59%	50%	63%	58%	47%	59%	47%	42%	61%	50%	55%	57%	44%	38%	39%
No crime violence or vandalism in the area	49%	48%	51%	75%	70%	60%	52%	68%	61%	51%	60%	57%	61%	42%	41%	66%	62%	51%	44%	48%	50%	56%	44%	47%	42%	41%	44%	32%	52%	45%	47%	37%	43%
Fresh fruit and vegetables once a day	49%	48%	52%	74%	61%	66%	58%	54%	78%	57%	50%	57%	40%	59%	51%	49%	58%	47%	49%	52%	38%	50%	44%	41%	42%	41%	61%	27%	43%	44%	34%	35%	41%
Not too much pollution or other environmental problems	42%	41%	47%	70%	68%	54%	50%	61%	54%	52%	50%	52%	59%	42%	35%	57%	53%	46%	40%	38%	44%	46%	39%	36%	39%	37%	33%	34%	47%	40%	39%	38%	39%
2 pairs of shoes suitable to the climate	58%	55%	68%	88%	79%	77%	79%	71%	67%	68%	67%	73%	64%	63%	74%	43%	61%	67%	65%	66%	58%	44%	63%	58%	62%	70%	55%	59%	49%	49%	46%	60%	35%
Refrigerator	58%	56%	66%	87%	89%	71%	75%	69%	78%	70%	60%	72%	60%	77%	75%	84%	54%	72%	62%	65%	61%	43%	64%	55%	63%	70%	58%	62%	50%	48%	50%	54%	35%
Well-maintained and kept in a decent state of repair	42%	41%	48%	69%	51%	58%	50%	59%	47%	60%	49%	49%	46%	41%	40%	48%	52%	52%	42%	40%	34%	43%	35%	42%	34%	27%	49%	34%	38%	41%	35%	30%	22%
Cooker big enough for HH	42%	39%	53%	82%	64%	69%	75%	57%	75%	58%	45%	52%	45%	71%	71%	75%	53%	58%	39%	58%	34%	41%	54%	37%	53%	66%	18%	48%	36%	17%	52%	43%	29%
A place to live with well maintained public amenities	34%	32%	42%	58%	47%	54%	45%	54%	48%	42%	48%	40%	43%	30%	28%	39%	48%	36%	37%	21%	26%	41%	23%	28%	23%	20%	31%	28%	28%	35%	35%	18%	26%
Access to local public transport	38%	36%	43%	62%	44%	52%	53%	50%	59%	45%	44%	41%	48%	35%	49%	36%	42%	33%	39%	41%	36%	40%	35%	37%	33%	30%	40%	29%	37%	30%	28%	21%	25%
Meat, chicken or fish at least once every two days	43%	42%	46%	53%	29%	62%	54%	39%	76%	50%	52%	38%	43%	30%	35%	39%	56%	36%	47%	34%	46%	36%	29%	41%	28%	39%	58%	22%	47%	44%	32%	37%	35%
A place to live that is not too dark, with enough natural light	39%	36%	48%	77%	57%	55%	55%	61%	61%	53%	45%	51%	47%	46%	38%	48%	52%	55%	43%	38%	30%	36%	35%	29%	35%	28%	31%	34%	32%	39%	33%	21%	27%
Repairing or replacing major electrical goods	40%	39%	42%	65%	49%	39%	59%	60%	54%	51%	45%	43%	37%	50%	63%	56%	46%	44%	35%	43%	39%	35%	35%	48%	33%	31%	43%	42%	40%	34%	34%	30%	27%
Washing machine	48%	45%	59%	74%	85%	56%	67%	66%	65%	61%	48%	68%	52%	77%	71%	74%	45%	60%	56%	61%	46%	34%	55%	41%	53%	37%	51%	59%	38%	39%	39%	21%	33%
A place to live without too much noise	28%	26%	36%	59%	51%	46%	41%	41%	49%	37%	40%	37%	39%	25%	23%	39%	46%	36%	33%	18%	22%	34%	19%	23%	19%	15%	25%	20%	21%	27%	30%	15%	18%
Being able to get basic banking services	29%	29%	28%	34%	38%	37%	35%	21%	36%	38%	32%	33%	37%	39%	41%	30%	36%	31%	23%	44%	41%	33%	32%	36%	29%	26%	25%	21%	36%	16%	24%	24%	25%
A place to live with enough space and privacy for everybody	31%	28%	42%	55%	44%	48%	46%	46%	42%	41%	46%	36%	51%	40%	31%	36%	45%	34%	42%	26%	26%	32%	24%	32%	24%	16%	25%	26%	25%	24%	32%	18%	18%
A place to live with enough space to invite friends and family	25%	23%	33%	40%	39%	41%	36%	40%	37%	35%	35%	29%	31%	29%	24%	20%	41%	27%	31%	18%	20%	26%	21%	21%	22%	14%	22%	17%	20%	22%	28%	15%	15%
Smart clothes	24%	19%	39%	43%	44%	53%	38%	37%	22%	26%	50%	56%	34%	18%	16%	33%	43%	41%	34%	21%	33%	23%	13%	14%	12%	20%	30%	26%	16%	12%	20%	9%	15%
Some new, not 2nd hand clothes	30%	26%	44%	75%	67%	62%	49%	44%	39%	39%	45%	52%	31%	33%	36%	37%	45%	36%	40%	24%	23%	21%	21%	25%	21%	26%	38%	21%	14%	21%	27%	14%	11%
Replacing worn out or broken furniture	21%	20%	27%	57%	40%	34%	44%	30%	40%	33%	37%	26%	19%	24%	28%	15%	33%	19%	23%	19%	12%	19%	16%	18%	15%	13%	28%	17%	15%	16%	23%	10%	10%
Buying presents for family or friends at least once a year	17%	14%	29%	26%	24%	34%	28%	41%	14%	16%	41%	32%	33%	13%	16%	7%	17%	13%	23%	23%	18%	18%	16%	14%	14%	20%	7%	31%	16%	10%	21%	17%	12%
Fixed telephone	18%	18%	22%	53%	35%	35%	41%	18%	12%	37%	13%	16%	13%	24%	28%	53%	19%	12%	18%	26%	8%	16%	25%	18%	25%	22%	12%	4%	12%	13%	9%	12%	12%
Spending a small amount of money each week on oneself	14%	13%	22%	23%	20%	28%	27%	19%	15%	19%	28%	18%	24%	10%	15%	11%	21%	14%	23%	16%	16%	14%	16%	9%	15%	6%	11%	9%	10%	10%	17%	8%	9%
Colour TV	19%	14%	39%	45%	55%	53%	61%	47%	35%	35%	36%	34%	28%	24%	19%	35%	16%	14%	31%	25%	15%	13%	17%	9%	15%	14%	9%	23%	10%	11%	34%	11%	5%
Being able to decorate one's home	13%	10%	23%	16%	9%	22%	20%	21%	16%	31%	16%	24%	30%	12%	10%	5%	17%	11%	29%	13%	9%	13%	11%	8%	10%	5%	7%	11%	10%	9%	12%	6%	7%
Paying for one week annual holiday away from home	15%	13%	25%	44%	27%	35%	33%	29%	17%	19%	22%	20%	23%	22%	13%	4%	16%	13%	23%	12%	11%	12%	9%	16%	8%	17%	8%	10%	12%	12%	14%	8%	10%
Participating in a regular leisure or sports activity	13%	12%	16%	17%	15%	19%	19%	22%	17%	19%	17%	16%	23%	32%	23%	15%	18%	11%	13%	11%	13%	11%	10%	11%	10%	13%	15%	13%	15%	9%	11%	13%	13%
Inviting friends or family for dinner at home once a month	12%	10%	20%	22%	17%	23%	26%	24%	13%	19%	22%	16%	17%	8%	10%	5%	14%	10%	20%	7%	9%	10%	8%	9%	9%	9%	9%	8%	8%	10%	13%	8%	9%
Going out once a month (restaurant, cinema, disco or concert, etc.)	11%	9%	18%	29%	21%	27%	26%	20%	13%	18%	27%	20%	19%	10%	14%	10%	14%	11%	14%	7%	10%	10%	7%	8%	7%	6%	8%	10%	9%	9%	13%	4%	5%
Car	17%	17%	20%	50%	84%	26%	32%	13%	29%	34%	20%	23%	21%	31%	32%	42%	23%	10%	14%	15%	13%	9%	10%	30%	9%	19%	16%	13%	14%	18%	19%	7%	4%
Buying newspapers, magazines and books	13%	10%	22%	19%	14%	29%	30%	27%	14%	14%	29%	27%	23%	13%	16%	12%	18%	12%	19%	16%	14%	8%	15%	7%	15%	13%	8%	13%	9%	10%	17%	7%	10%
Mobile phone	12%	9%	24%	26%	41%	35%	34%	21%	22%	15%	38%	25%	33%	14%	20%	32%	17%	12%	16%	8%	21%	7%	5%	6%	4%	9%	10%	20%	8%	9%	22%	10%	4%
Going to the hairdresser regularly	11%	9%	20%	12%	4%	33%	27%	21%	13%	14%	28%	21%	25%	9%	12%	15%	19%	10%	15%	15%	10%	7%	10%	5%	10%	9%	12%	8%	8%	8%	22%	5%	9%
Computer	9%	6%	17%	10%	18%	26%	22%	12%	13%	18%	20%	17%	19%	11%	11%	20%	9%	6%	14%	7%	8%	6%	6%	5%	5%	8%	5%	9%	6%	8%	13%	10%	6%
Internet connection	7%	5%	14%	8%	12%	20%	19%	10%	11%	15%	19%	13%	19%	8%	11%	18%	8%	6%	12%	5%	8%	5%	4%	4%	4%	9%	4%	7%	6%	6%	11%	9%	5%

Notes: Deprivations coloured in red have high proportions of the population agreeing that they are necessities, deprivations coloured in green have low percentages of the population agreeing that they are necessities. Although there is some variation between countries (i.e. left to right across the heat map) the ordering of necessities within countries (i.e. top to bottom in the heat map) is very similar.
Source: Eurobarometer special n° 279, Wave 67.1 (computations: http://www.poverty.ac.uk/).

Annex 5 (Table A10): Countries' official abbreviations

'Old' Member States		'New' Member States	
BE	Belgium	***2004 Enlargement***	
DK	Denmark	**CZ**	Czech Republic
DE	Germany	**EE**	Estonia
IE	Ireland	**CY**	Cyprus
EL	Greece	**LV**	Latvia
ES	Spain	**LT**	Lithuania
FR	France	**HU**	Hungary
IT	Italy	**MT**	Malta
LU	Luxembourg	**PL**	Poland
NL	The Netherlands	**SI**	Slovenia
AT	Austria	**SK**	Slovakia
PT	Portugal		
FI	Finland	***2007 Enlargement***	
SE	Sweden	**BG**	Bulgaria
UK	United Kingdom	**RO**	Romania

In EU averages, countries are weighted by their population sizes:

- EU-27 averages are weighted averages covering all 27 EU Member States
- EU-15 averages are weighted averages limited to the 15 'old' Member States;
- NMS-10 ('New Member States 10') are weighted averages limited to the 10 'new' Member States which joined the EU in 2004;
- NMS-12 ('New Member States 12') are weighted averages limited to the 12 'new' Member States which joined the EU in 2004 or 2007.

Annex 6: Incidence of items

Table A11: Incidence of items, whole population and children, 2009, (%)

Whole population	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	EU-27
Household: Arrears	8	34	5	4	5	13	13	27	9	10	11	20	20	8	5	22	8	3	7	14	8	25	18	14	10	6	4	12
Household: Car	7	26	10	4	5	15	8	8	4	3	2	1	27	15	3	21	2	2	5	15	11	43	3	19	5	2	4	9
Household: Unexpected expenses	24	62	38	19	31	30	46	30	33	31	30	41	73	53	27	76	29	14	23	52	27	41	40	37	24	17	30	35
Household: Inadequate warmth	5	65	5	1	5	2	4	17	7	5	9	22	16	25	1	10	12	1	2	17	31	20	4	4	1	1	6	10
Household: Computer & Internet	5	23	6	1	2	6	3	11	4	3	4	2	8	8	1	9	1	0	3	10	8	17	3	10	1	0	3	5
Household: Replace worn-out furniture	18	80	49	8	18	45	15	47	36	32	3	47	65	46	16	57	48	14	11	39	57	68	36	42	9	5	13	31
Household: Holiday	27	63	41	8	22	54	36	50	40	30	39	45	62	39	17	67	65	9	23	64	66	76	31	56	13	10	25	38
Household: Meat	5	40	11	1	8	9	2	11	2	7	6	5	24	21	1	27	11	1	10	18	5	23	10	25	2	2	4	10
Adult: Clothes	7	57	5	4	6	10	4	11	3	7	7	6	34	25	5	32	16	1	6	16	23	34	13	10	5	2	6	12
Adult: Shoes	1	12	1	1	2	2	2	1	1	4	1	1	11	2	2	3	1	1	1	3	7	10	2	3	0	1	2	3
Adult: Drink/meal once a month	10	47	3	1	23	10	10	7	7	6	9	3	26	26	8	40	22	2	7	15	25	57	6	9	1	8	10	13
Adult: Leisure activity	14	48	7	3	19	9	7	22	10	11	16	7	38	39	8	35	18	6	15	26	27	58	17	12	2	4	16	18
Adult: Pocket money	11	54	12	3	14	12	12	11	11	14	17	6	35	35	9	37	16	5	13	22	28	53	10	20	2	5	17	17

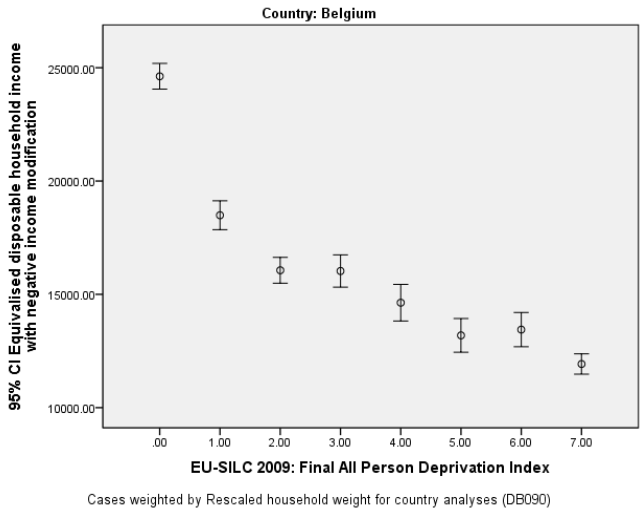
Children (1-15)	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SE	FI	SK	UK	EU-27
Household: Arrears	13	42	9	5	8	20	23	34	15	16	16	25	32	12	7	33	12	4	10	19	13	31	22	18	14	8	7	16
Household: Car	7	30	12	3	4	14	9	6	5	4	2	1	29	16	3	25	2	2	5	15	11	54	2	19	2	2	7	9
Household: Inadequate warmth	6	65	5	1	7	2	5	19	7	5	9	18	19	22	1	9	11	1	2	16	29	20	4	4	1	1	6	8
Household: Computer & Internet	4	27	7	0	1	5	5	14	7	3	5	3	10	10	1	12	1	0	3	10	9	27	2	12	0	0	3	6
Household: Worn-out furniture	23	80	46	10	23	44	20	46	40	35	3	46	66	47	22	64	52	14	14	39	61	72	34	47	11	5	18	31
Children: School trips	3	30	3	0	2	7	4	9	6	5	5	1	14	8	4	8	1	0	2	12	15	48	2	*10*	1	0	3	6
Children: Suitable books	3	32	2	1	2	7	1	6	1	2	5	2	13	8	1	13	1	0	1	10	12	29	1	*11*	0	0	0	5
Children: Celebrations	3	*27*	2	0	2	5	2	12	6	3	5	5	15	12	2	9	5	0	3	13	13	31	2	*9*	0	1	1	6
Children: Some new clothes	6	38	5	1	3	7	3	1	4	5	5	1	26	15	3	21	7	1	2	4	17	23	10	*15*	2	0	2	7
Children: Invite friends	4	*49*	3	1	2	6	1	6	5	3	6	3	23	12	3	30	4	1	5	9	22	35	2	*14*	0	1	2	7
Children: Fresh fruits	2	37	2	0	2	16	1	2	1	5	2	1	17	9	1	17	3	0	1	8	4	21	2	*12*	1	0	1	5
Children: Holiday	29	62	42	9	21	19	45	31	42	17	28	19	35	38	10	67	46	8	18	36	50	64	10	*22*	6	11	20	27
Children: Place to do homework	7	16	5	1	6	6	1	13	4	3	10	5	5	7	11	4	4	4	3	5	12	18	4	*6*	2	3	2	5
Children: Indoor games	2	*35*	2	1	1	5	1	5	2	1	4	2	13	8	1	13	2	0	1	10	12	50	1	*7*	0	0	1	5
Children: Leisure activities	7	*52*	5	1	6	9	6	12	6	7	10	8	24	19	3	24	4	2	9	22	27	62	8	*8*	1	1	7	11
Children: Meat, chicken, fish	3	35	4	1	5	10	2	5	1	2	4	1	12	9	1	13	5	0	2	6	6	26	2	*16*	0	0	1	5
Children: Outdoor equipment	4	*49*	6	1	2	10	2	7	3	2	3	3	22	11	2	19	6	0	2	11	8	55	1	*14*	1	1	1	7
Children: Two pairs of shoes	3	47	2	1	3	5	4	1	2	5	2	0	13	2	1	5	3	1	1	3	4	17	2	*8*	1	1	3	4

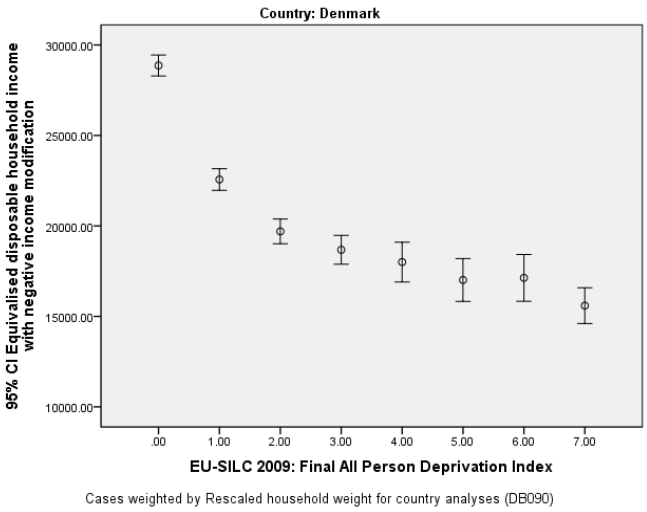
Note 1: If at least one child does not have a children's item, it is assumed that all the children belonging to that household lack that item.
Note 2: Two children MD items were collected only in households with at least one child attending school (school trips and place to do homework). We have considered that children living in households where no child is attending school do not lack any of these 2 items.
Note 3: The item 'Children holidays' was optional and was not collected in 9 countries (BE, CZ, DK, IE, ES, LT, HU, NL, SE). In these countries, we have used the 'Household holiday item'.
Note 4: Unreliable estimations due to high proportion of missing (> 20 % missing) appear in italics in the table.

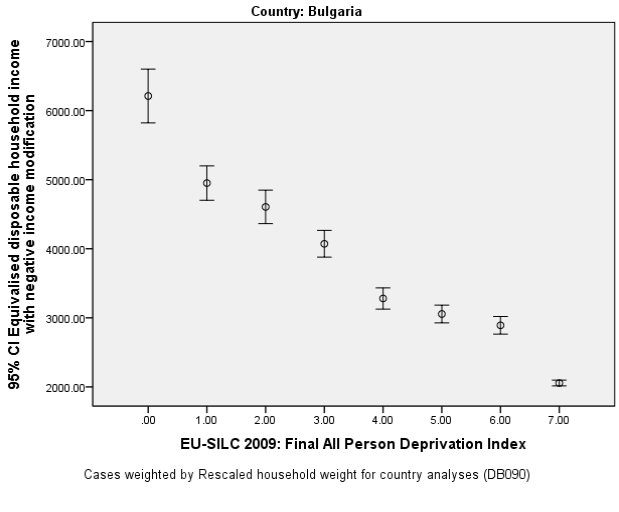
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

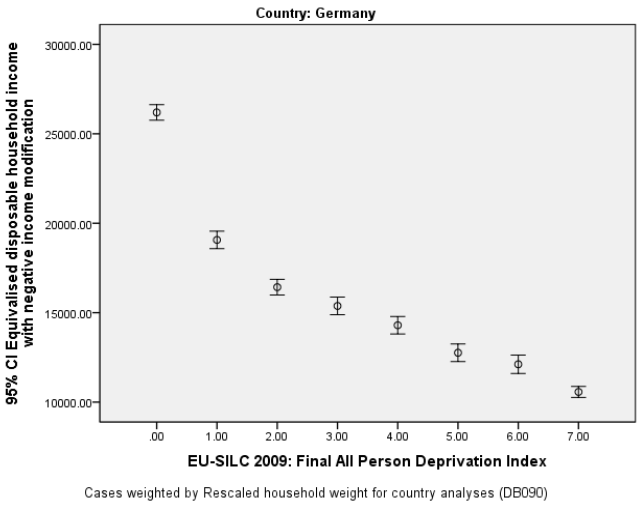
Annex 7: Mean income by deprivation level

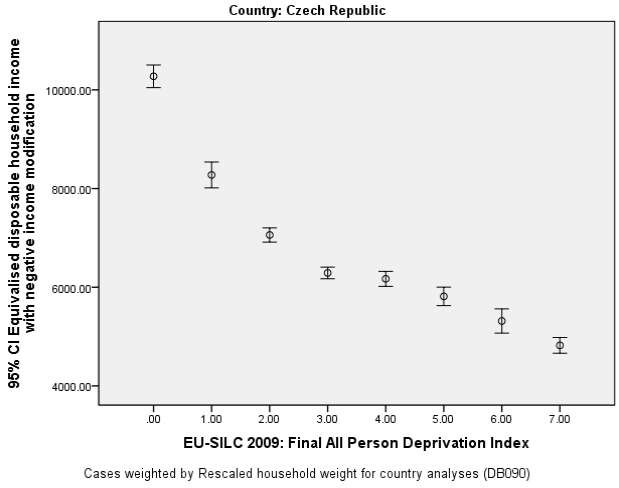
Figure A7: Mean equivalised disposable income, by deprivation level, by country, whole population, 2009, (95 % confidence interval, euros)

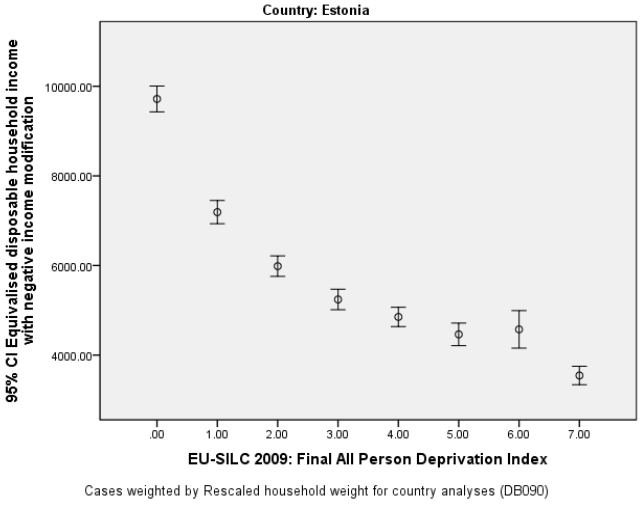


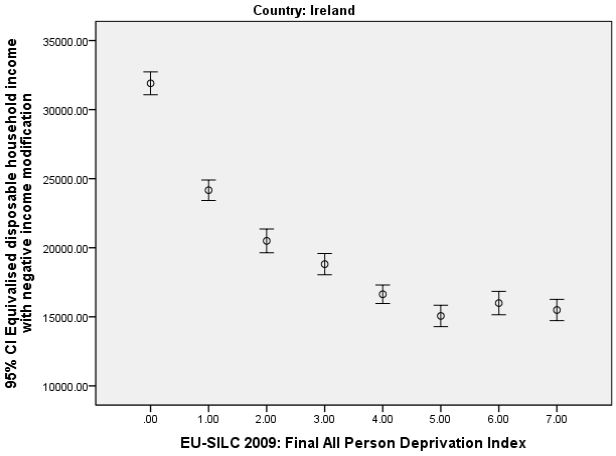




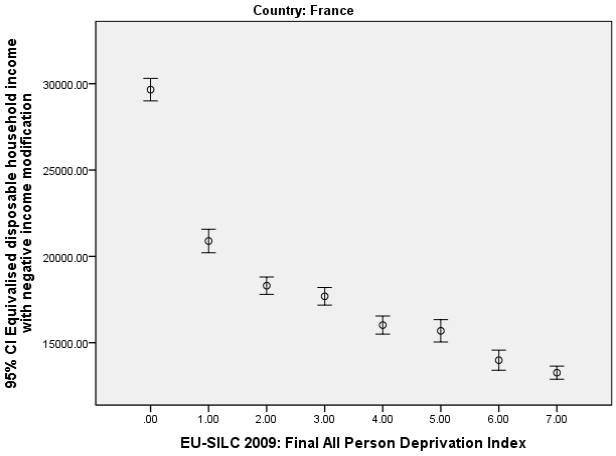




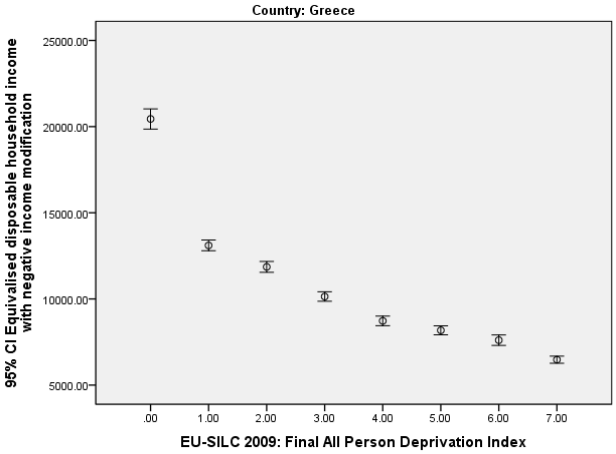




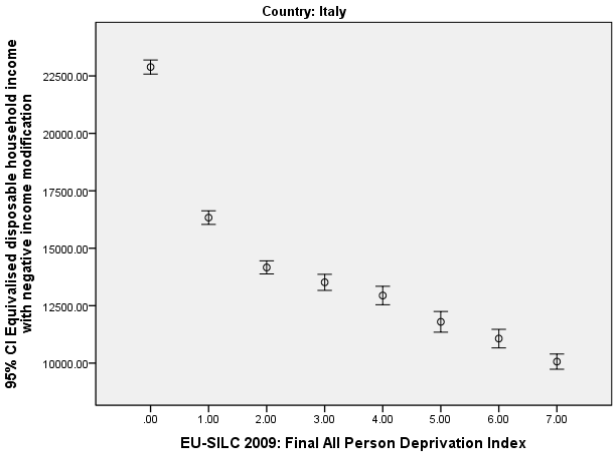
Cases weighted by Rescaled household weight for country analyses (DB090)



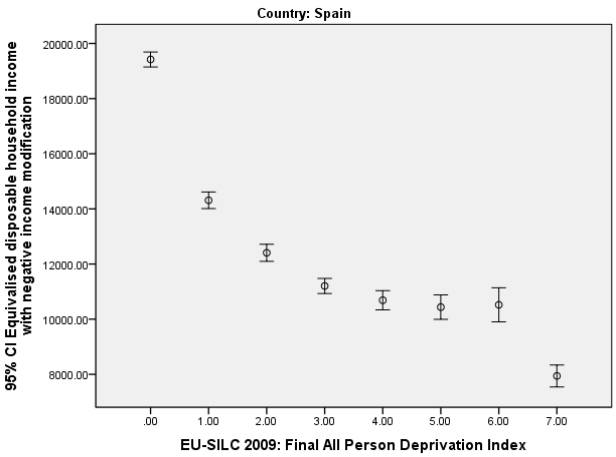
Cases weighted by Rescaled household weight for country analyses (DB090)



Cases weighted by Rescaled household weight for country analyses (DB090)



Cases weighted by Rescaled household weight for country analyses (DB090)



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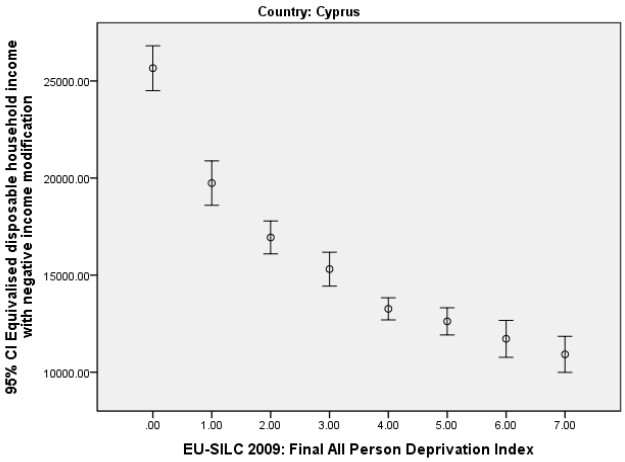

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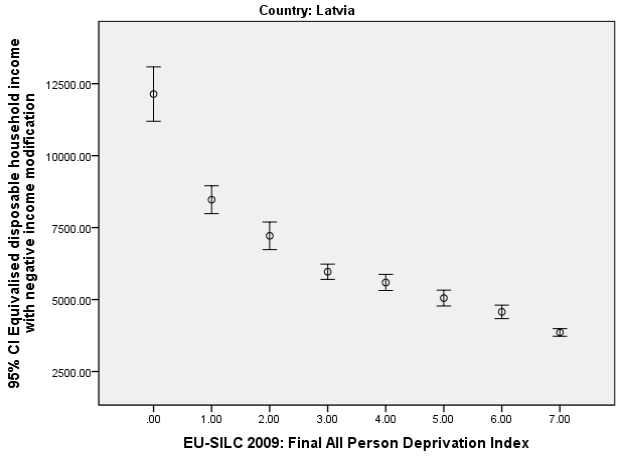

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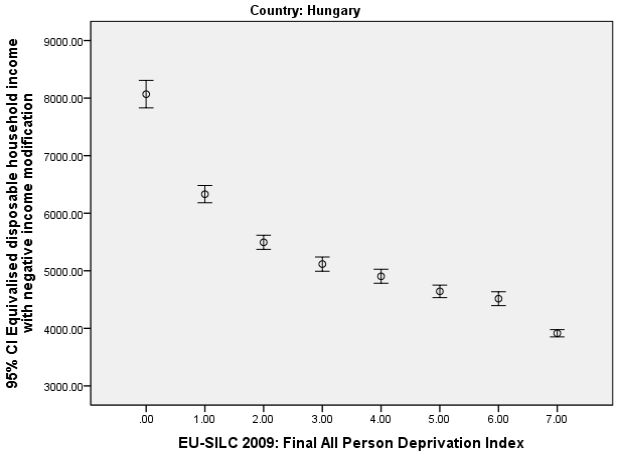

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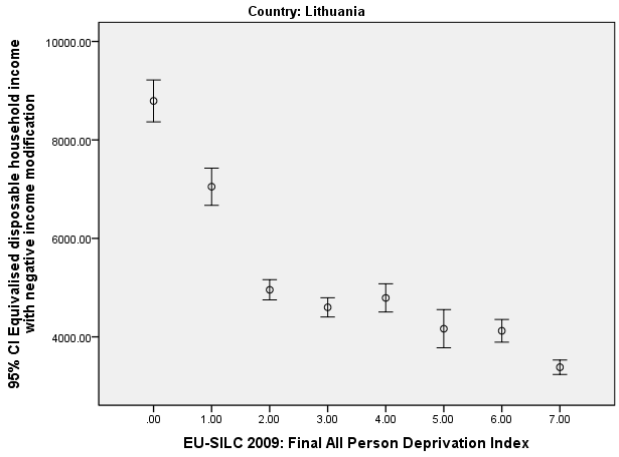
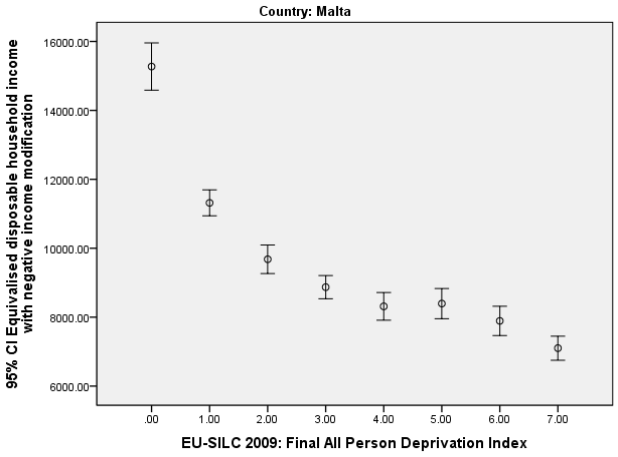


Cases weighted by Rescaled household weight for country analyses (DB090)



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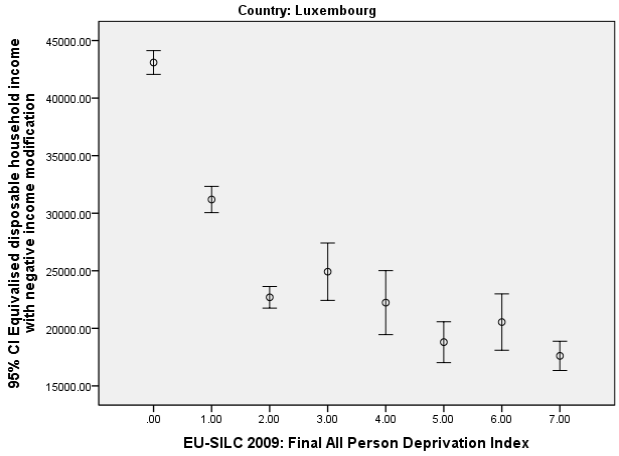

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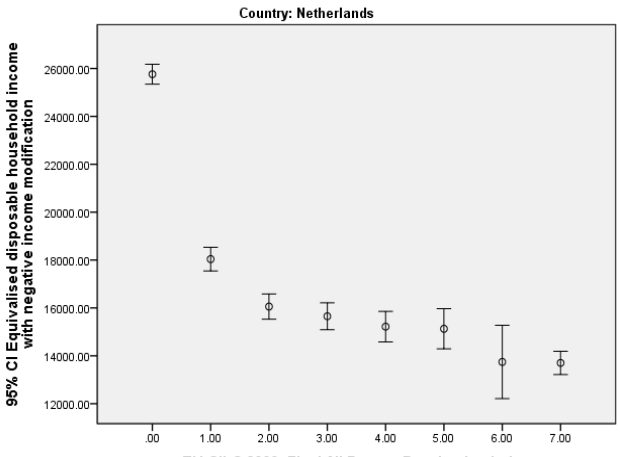
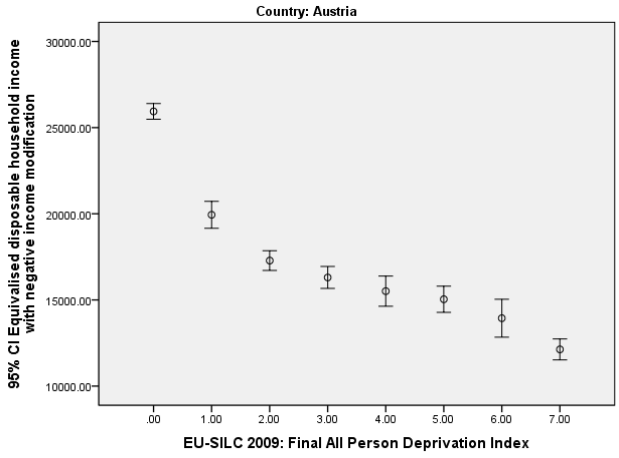


Cases weighted by Rescaled household weight for country analyses (DB090)



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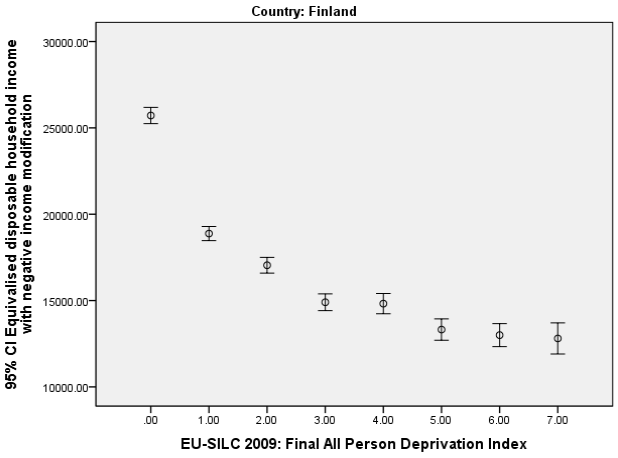

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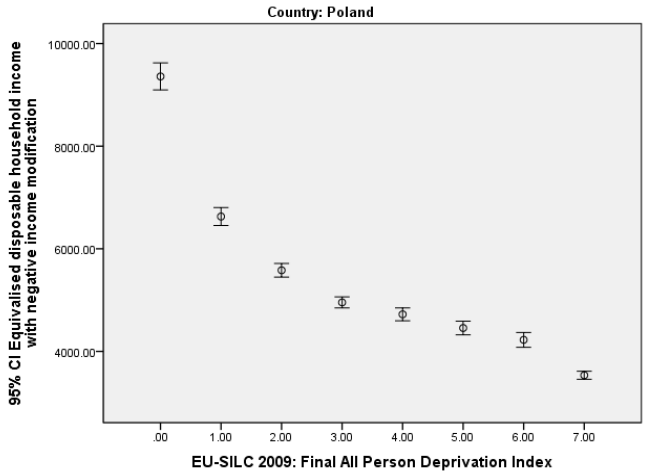
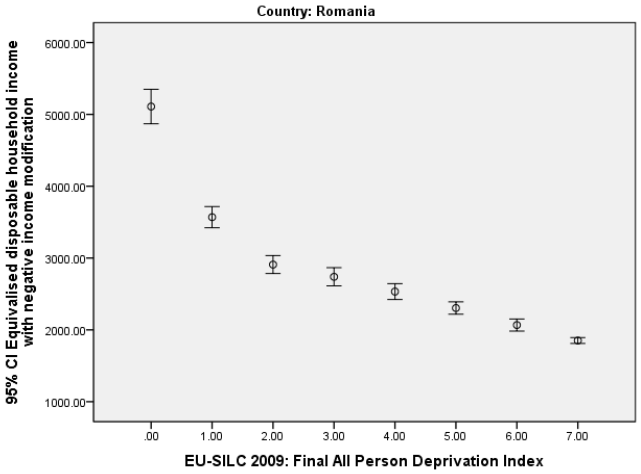


Cases weighted by Rescaled household weight for country analyses (DB090)



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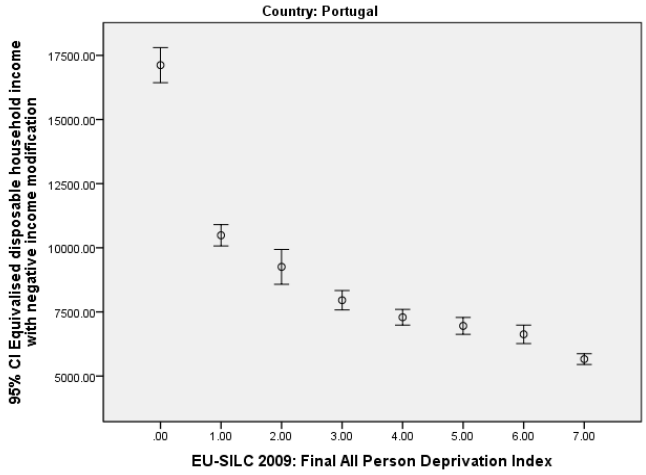
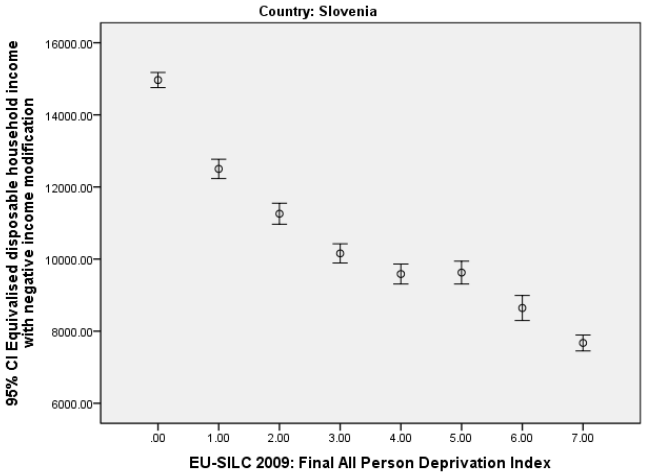


Cases weighted by Rescaled household weight for country analyses (DB090)



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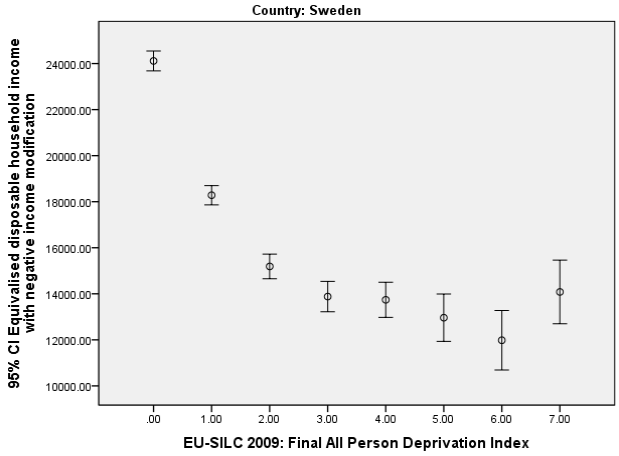
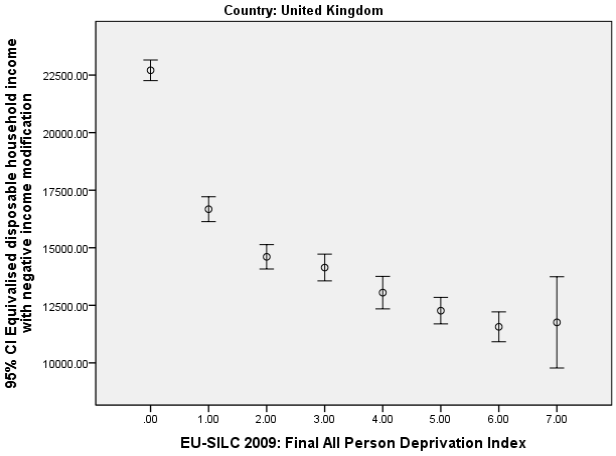
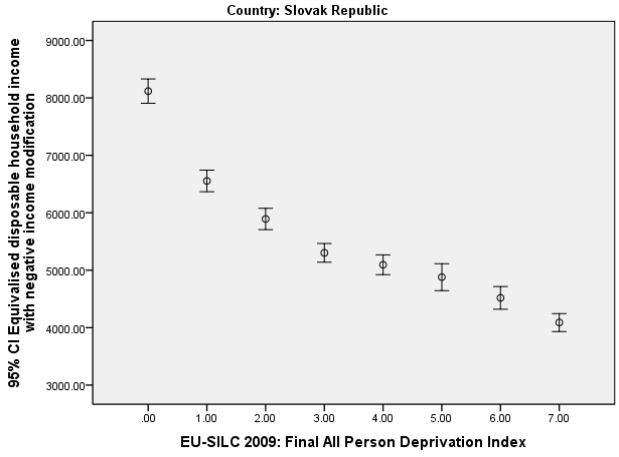


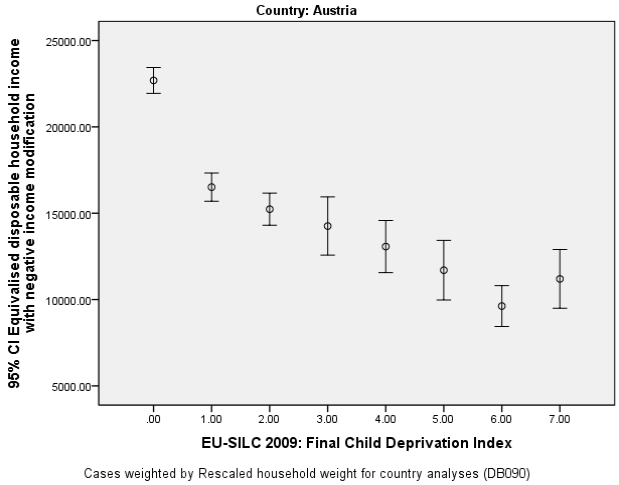


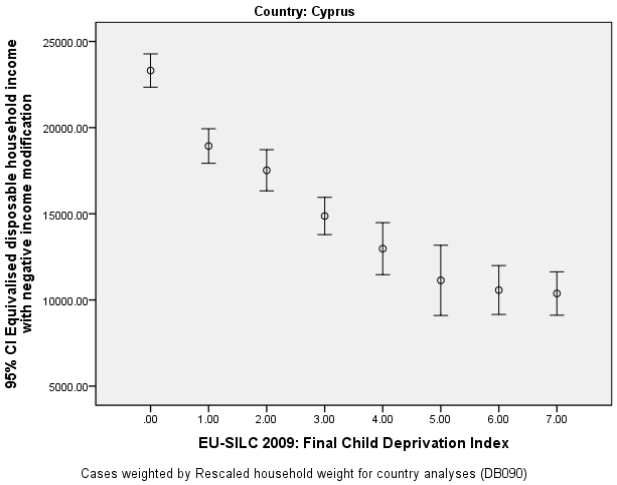


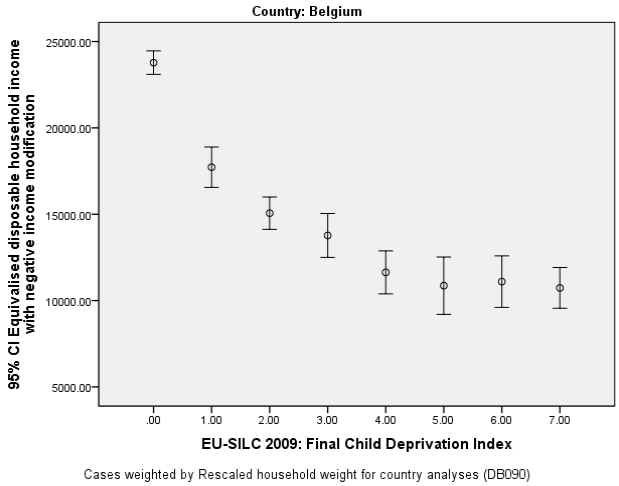
Notes: On the X axis, the '7' corresponds to seven or more deprivations. This grouping was required as some of the richer EU countries had very few cases with larger deprivation scores.

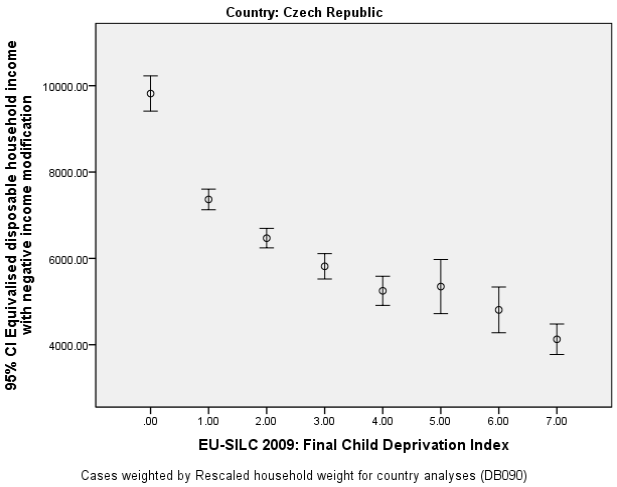
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

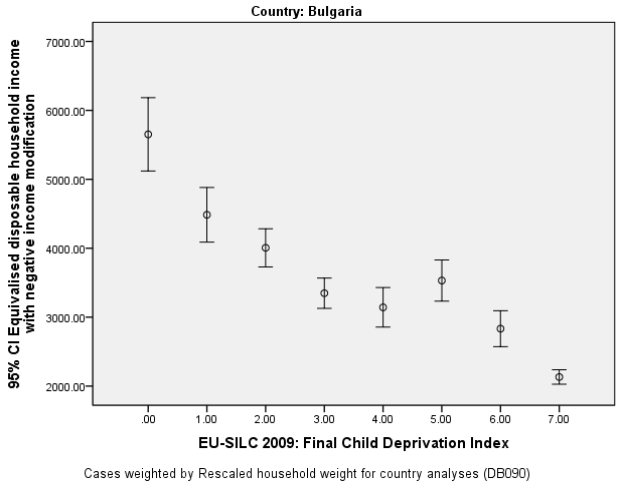
Figure A8: 95 % confidence interval equivalised disposable income, by deprivation level, by country, child population, 2009, (95 % confidence interval, euros)

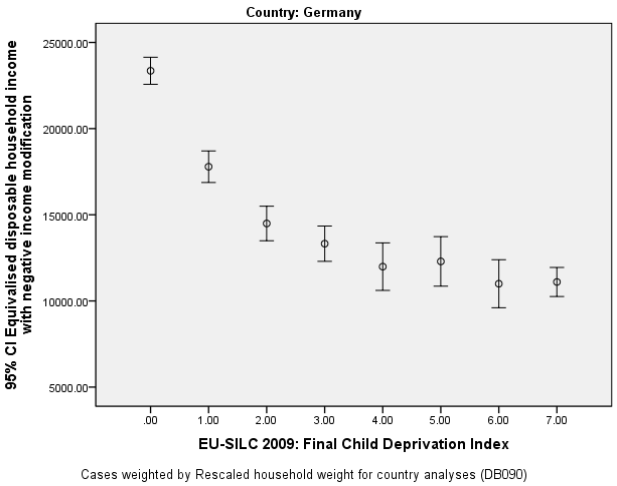


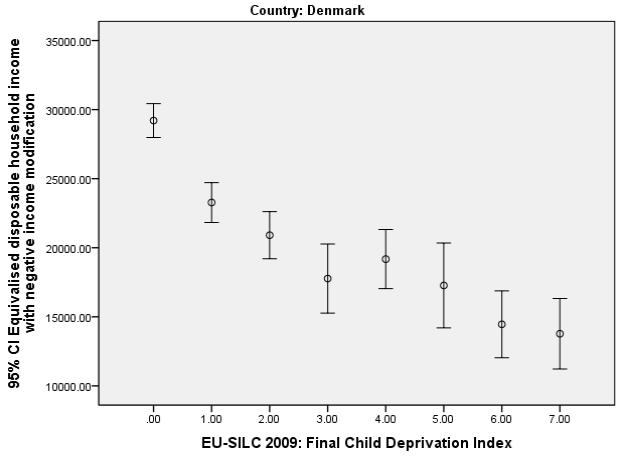




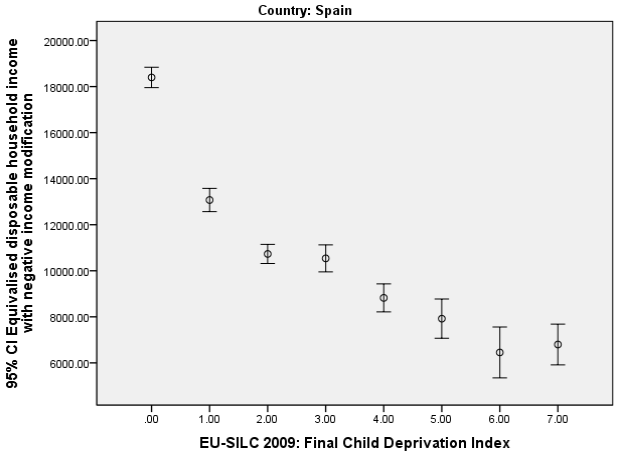




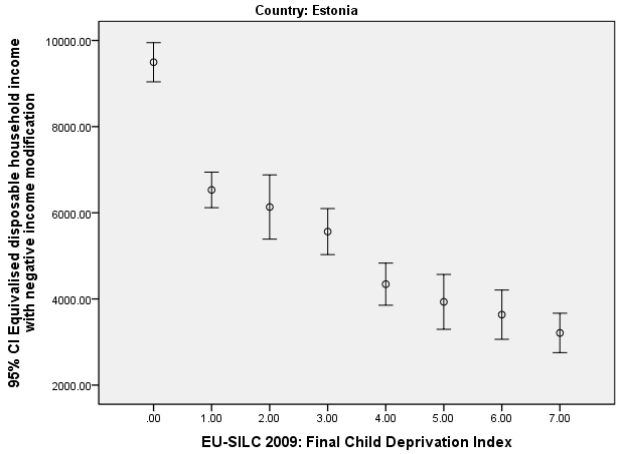




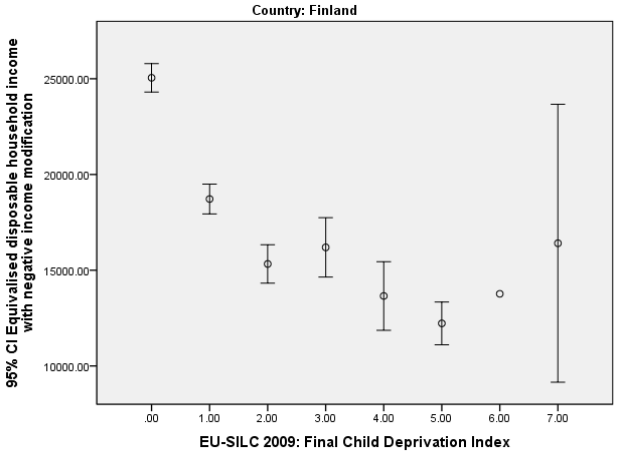
Cases weighted by Rescaled household weight for country analyses (DB090)



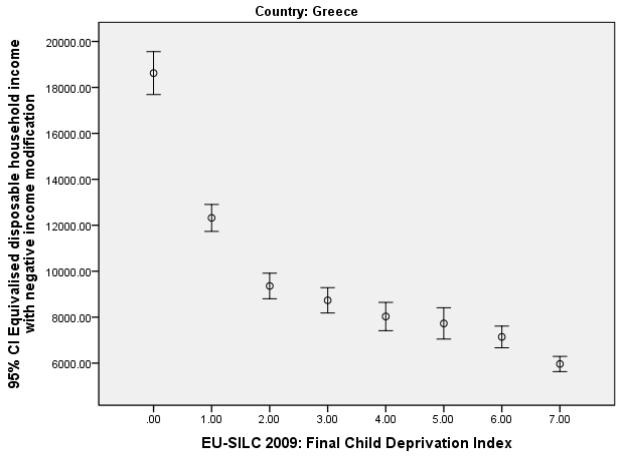
Cases weighted by Rescaled household weight for country analyses (DB090)



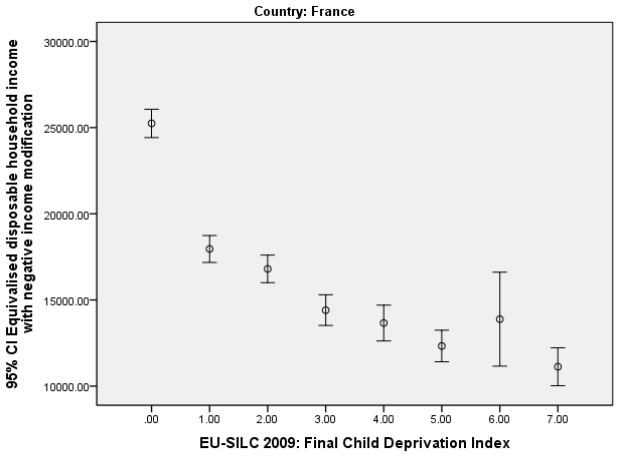
Cases weighted by Rescaled household weight for country analyses (DB090)



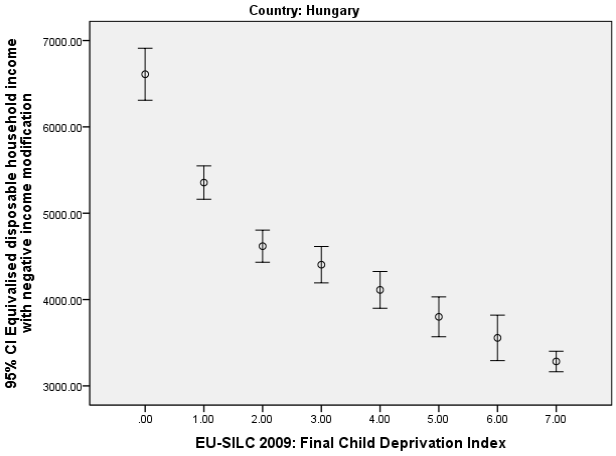
Cases weighted by Rescaled household weight for country analyses (DB090)



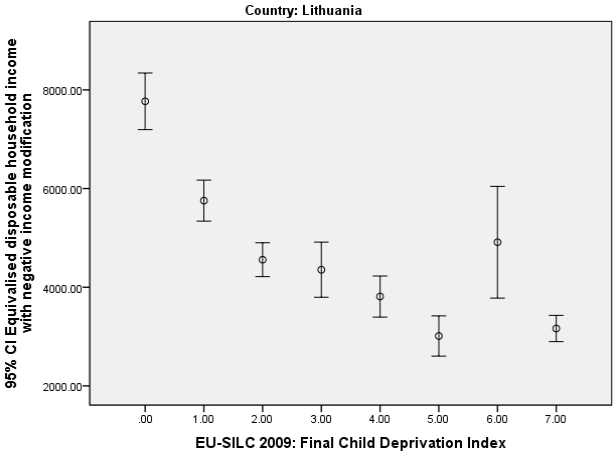
Cases weighted by Rescaled household weight for country analyses (DB090)



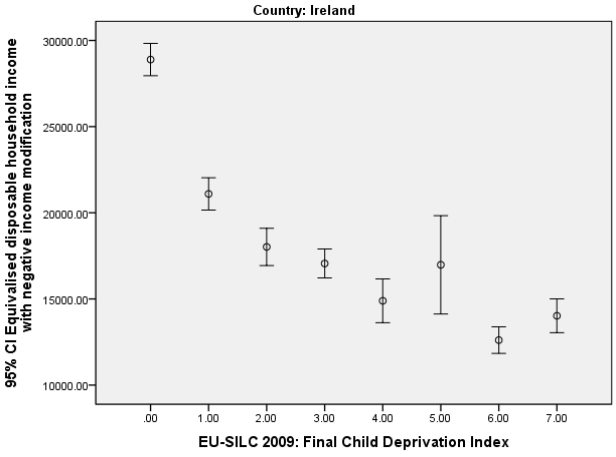
Cases weighted by Rescaled household weight for country analyses (DB090)



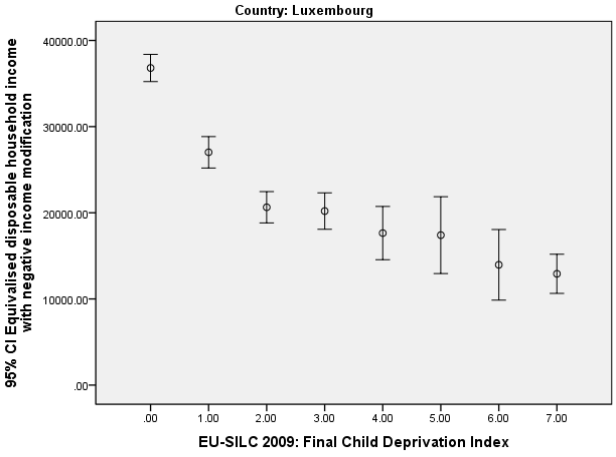
Cases weighted by Rescaled household weight for country analyses (DB090)



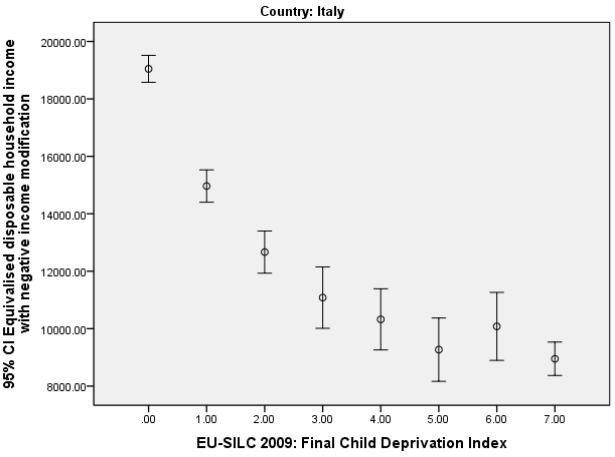
Cases weighted by Rescaled household weight for country analyses (DB090)



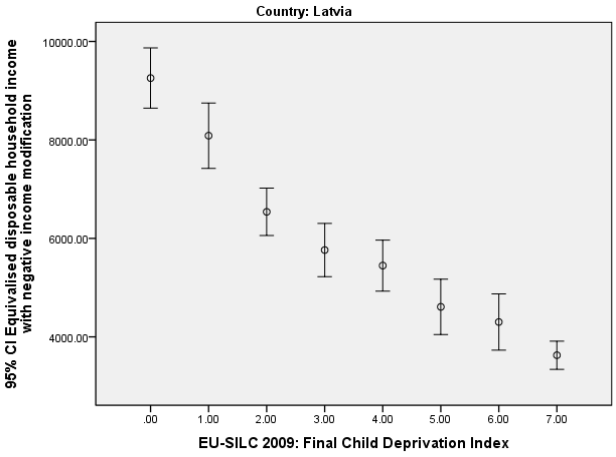
Cases weighted by Rescaled household weight for country analyses (DB090)



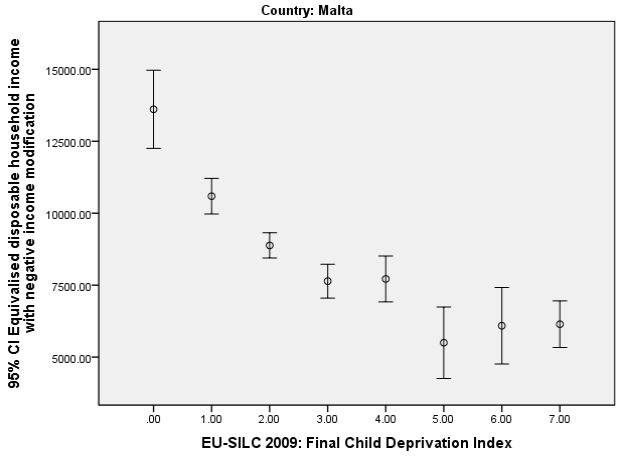
Cases weighted by Rescaled household weight for country analyses (DB090)



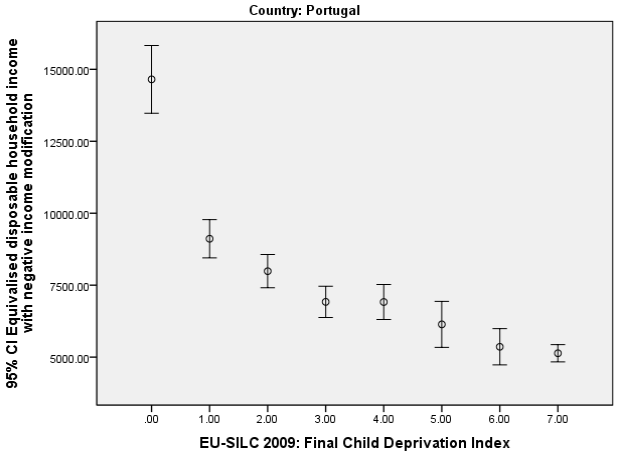
Cases weighted by Rescaled household weight for country analyses (DB090)



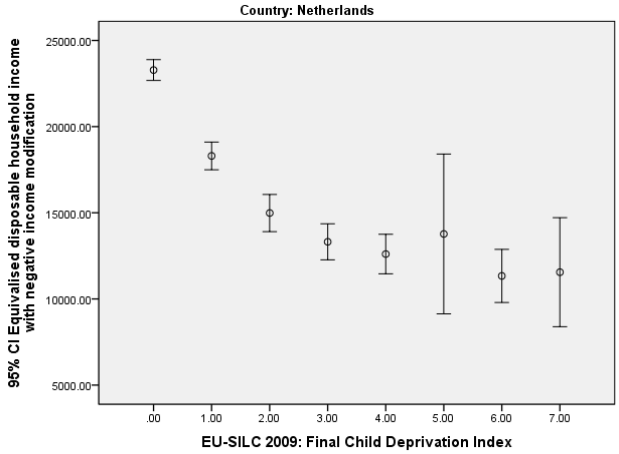
Cases weighted by Rescaled household weight for country analyses (DB090)



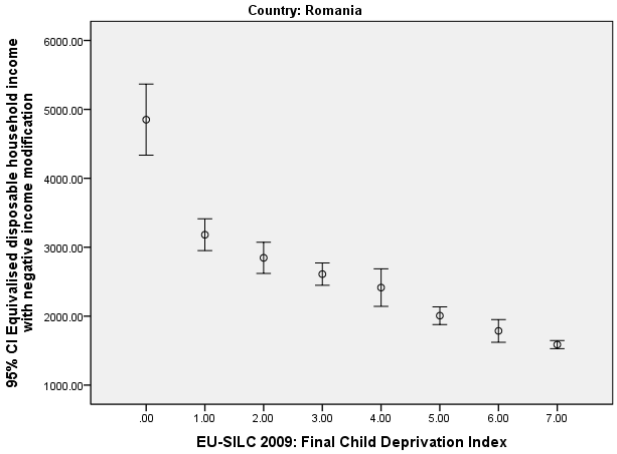
Cases weighted by Rescaled household weight for country analyses (DB090)



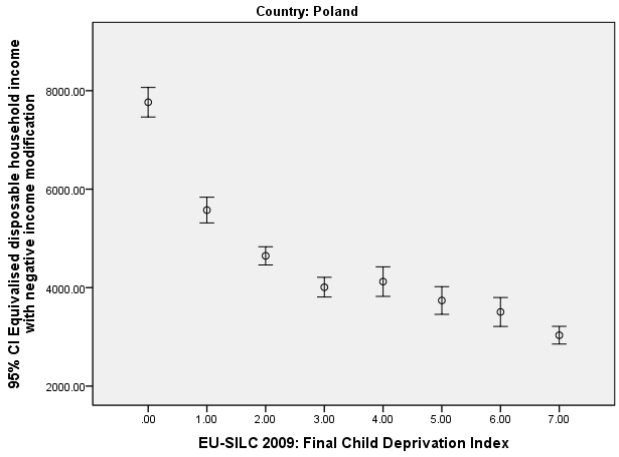
Cases weighted by Rescaled household weight for country analyses (DB090)



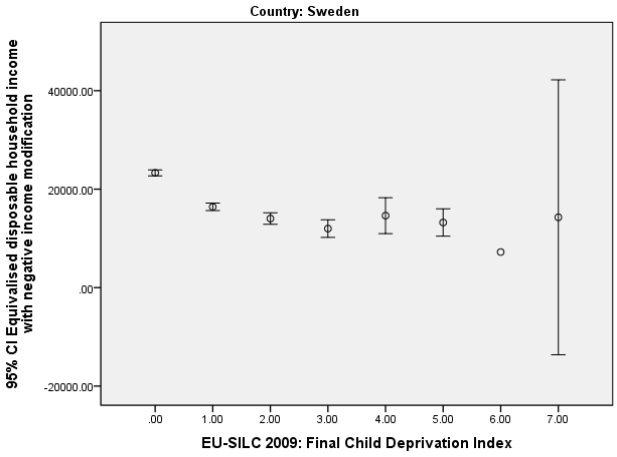
Cases weighted by Rescaled household weight for country analyses (DB090)



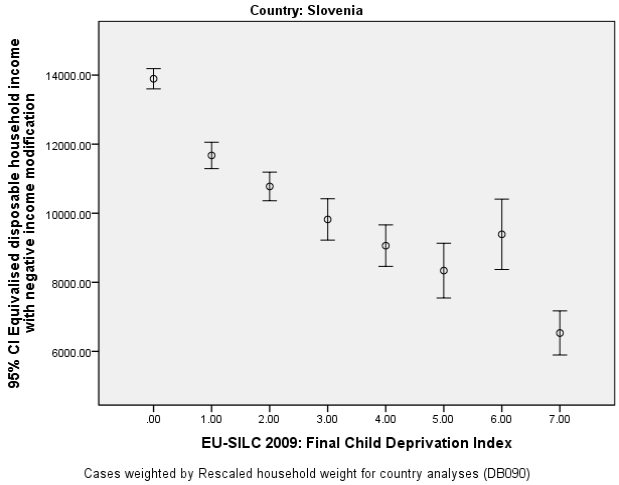
Cases weighted by Rescaled household weight for country analyses (DB090)

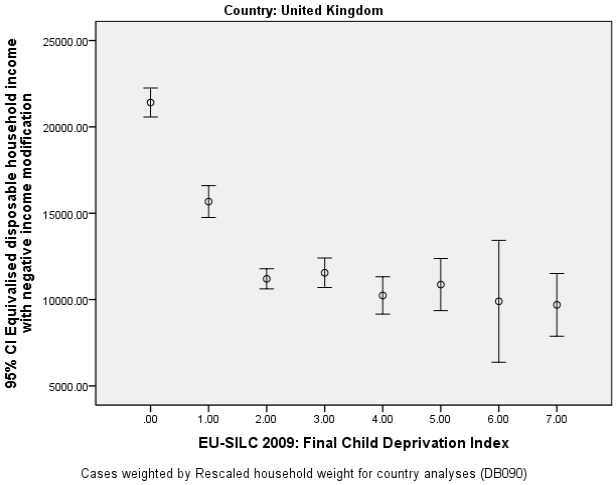


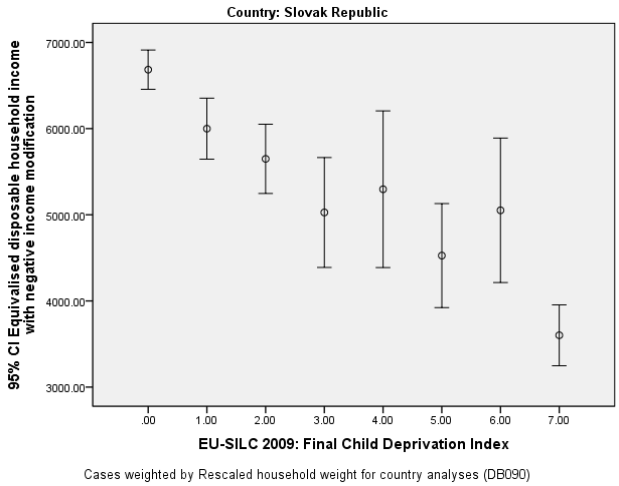
Cases weighted by Rescaled household weight for country analyses (DB090)



Cases weighted by Rescaled household weight for country analyses (DB090)







Notes: On the X axis, the '7' corresponds to seven or more deprivations. This grouping was required as some of the richer EU countries had very few cases with larger deprivation scores.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Annex 8: Statistical annex

Annex 8.a: Whole population

Table A12: Incidence of MD 5+ broken down by sex, age, poverty risk, household type, degree of urbanisation and household work intensity, by country, whole population, 2009, (%)

MD 5+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Total	17.7s	11.5	62.6	12.5	4.8	15.5	14.5	11.9	20.7	10.9	13.9	13.5	12.0	42.8
Sex														
Female	18.4s	12.5	64.0	13.3	5.2	16.3	14.9	12.4	21.7	10.8	15.1	13.9	12.6	43.7
Male	16.9s	10.4	61.2	11.7	4.4	14.7	14.0	11.4	19.7	10.9	12.6	13.0	11.4	41.7
Age														
0-17 years	20.7s	14.6	62.8	14.9	5.2	20.5	16.6	16.9	21.8	13.3	17.3	16.8	10.2	45.2
18-49 years	17.7s	11.3	58.0	11.8	5.6	16.4	13.4	11.0	19.0	11.2	14.6	14.0	11.4	39.7
50-64 years	16.7s	11.1	61.1	12.3	4.0	15.2	14.6	10.4	18.9	9.5	10.9	11.0	13.2	44.6
65 years or more	15.0s	8.3	76.3	12.3	3.0	9.5	15.1	5.3	25.7	8.8	11.1	11.8	15.9	47.1
Poverty risk														
Non-poor	12.9s	6.5	54.1	9.3	3.4	9.4	9.7	8.3	13.1	7.6	9.6	8.9	8.8	34.2
Poor	42.5s	40.5	93.5	47.3	13.7	48.7	34.1	32.8	51.7	24.5	43.0	33.7	28.6	67.7
Household type														
Single less 65	20.7s	21.8	64.5	19.4	9.6	25.1	17.7	17.4	20.1	10.7	19.0	12.8	14.4	44.3
Single 65 or more	18.2s	12.8	84.1	18.6	5.0	16.0	17.7	6.9	32.8	11.4	16.2	13.3	21.7	52.4
Single male	17.5s	16.6	62.7	16.1	8.1	22.3	17.8	15.4	18.9	9.8	14.6	9.9	14.4	45.2
Single female	21.2s	19.9	84.4	20.9	8.2	22.1	17.7	9.4	29.5	12.1	20.3	15.2	20.3	49.7
Single all	19.7s	18.3	77.3	19.0	8.2	22.2	17.7	12.3	25.8	11.0	17.9	13.1	17.8	48.2
2 adults no child	13.9s	6.6	63.1	10.6	2.1	9.6	12.7	7.8	19.2	9.3	9.3	11.0	14.9	42.7
All hhds no child	15.5s	10.3	65.2	12.3	4.8	13.9	14.3	8.8	20.2	9.6	12.0	11.5	15.4	44.1
Single parents	35.9s	34.2	69.6	39.8	18.0	43.7	26.9	37.3	39.2	24.8	36.7	23.2	28.5	59.2
2 adults, 1 child	14.0s	9.1	54.6	10.4	2.6	11.8	11.1	8.6	20.1	9.8	9.2	12.3	17.2	37.4
2 adults, 2 children	13.7s	8.0	52.2	7.4	2.1	13.0	10.3	9.7	19.5	9.6	9.8	12.3	7.6	36.7
2 adults, 3+ children	22.5s	12.1	83.9	19.6	2.4	20.6	21.1	11.7	22.3	17.9	16.6	26.4	6.7	57.8
Other hhds + children	26.5s	9.4	63.9	12.1	4.9	14.5	15.2	8.7	23.4	16.4	23.0	17.7	6.7	40.3
All hhds + children	19.6s	12.6	60.6	12.8	4.8	17.7	14.7	13.8	21.0	12.1	15.5	15.5	10.1	41.8

Degree of urbanisation (population density of the area)														
Densely populated	17.1s	14.5	55.3	11.8	5.5	15.5	13.9	11.9	19.4	11.0	16.4	14.4	11.8	42.7
Intermediate	13.8s	7.7	70.0	13.8	4.0	14.0	:u	13.4	15.9	12.0	11.3	13.2	14.1	:u
Thinly populated	24.9s	10.6	68.0	12.4	5.0	19.0	15.1	10.7	23.1	9.8	12.4	11.8	11.5	42.9
Work intensity (WI)														
Very low WI	48.4s	46.8	91.8	47.3	24.8	56.6	50.8	40.2	34.8	34.4	46.9	32.4	43.9	78.7
Low WI	35.0s	24.4	89.0	44.4	19.3	30.2	31.9	21.4	40.0	26.2	34.8	27.4	21.8	74.3
Medium WI	21.3s	15.0	77.0	15.0	5.3	16.8	15.3	6.5	26.0	12.3	18.0	17.3	12.3	50.3
High WI	15.3s	6.0	55.9	11.4	6.5	12.2	15.7	2.5	17.3	10.8	14.2	12.3	11.4	47.4
Very high WI	10.3s	3.5	45.1	6.5	1.8	7.7	8.8	2.0	10.8	4.8	7.4	6.2	7.6	29.3

Notes: s = Eurostat estimate. u = Unreliable (i.e. due to small sample size). : = Non-available. Hhds: households. Individual's age is measured at the end of the income reference year. See section 1 for poverty risk and the household work intensity (WI) definitions. The WI breakdowns are: [0 - 0.2] very low work intensity (WI);]0.2 -0.45[low WI; [0.45 -0.55] medium WI;]0.55 - 0.85] high WI;]0.85 - 1] very high WI. Densely populated area: Contiguous set of local areas, each of which has a density of more than 500 inhabitants per km², where the total population for the set is at least 50 000 inhabitants. Intermediate area: Contiguous set of local areas, not belonging to a densely populated area, each of which has a density superior to 100 inhabitants per km², and either with a total population for the set of at least 50 000 inhabitants or adjacent to a densely populated area. Thinly populated area: Contiguous set of local areas belonging neither to a densely populated nor to an intermediate area.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A12 (continued):

MD 5+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Total	30.5	5.9	43.9	18.6	5.0	10.7	26.2	28.3	60.4	15.6	19.6	5.3	2.6	11.3
Sex														
Female	31.7	6.4	44.6	19.0	5.3	11.4	26.7	29.2	60.9	16.3	20.5	5.5	2.9	11.9
Male	29.2	5.3	43.2	18.1	4.6	9.9	25.6	27.3	59.9	14.8	18.6	5.1	2.3	10.7
Age														
0-17 years	29.8	7.8	51.7	23.0	5.7	14.2	27.0	32.5	67.0	13.8	23.2	5.7	2.7	15.9
18-49 years	27.3	6.3	44.7	17.5	4.9	10.2	23.7	25.9	58.0	14.6	18.0	5.3	3.0	11.6
50-64 years	35.1	4.9	41.4	18.5	5.1	10.7	29.2	26.3	57.8	18.8	17.9	5.5	2.4	9.3
65 years or more	36.2	2.5	35.8	16.0	3.7	8.1	29.0	32.2	62.8	16.3	23.4	4.6	1.8	6.1
Poverty risk														
Non-poor	23.7	2.8	39.5	15.4	3.2	6.7	20.3	22.5	53.7	12.7	15.6	3.0	1.8	7.6
Poor	56.9	23.4	75.2	37.0	18.9	40.1	54.7	55.2	83.7	37.9	52.2	19.6	7.8	29.0
Household type														
Single less 65	42.0	5.9	46.7	23.3	11.5	13.6	34.1	29.1	59.2	34.9	29.2	11.1	5.8	17.7
Single 65 or more	42.8	5.0	40.4	16.4	4.2	13.1	34.1	35.8	65.3	21.5	29.8	8.5	3.3	7.2
Single male	41.1	4.5	40.3	13.6	9.4	12.6	32.6	25.3	56.5	25.9	28.0	9.4	4.3	14.0
Single female	43.1	6.5	45.0	23.0	9.1	14.1	34.7	37.1	65.8	28.7	30.1	10.8	5.5	12.2
Single all	42.4	5.6	43.5	19.4	9.3	13.4	34.1	33.3	62.7	27.7	29.5	10.2	4.9	13.0
2 adults no child	32.0	4.1	37.2	14.5	2.9	7.3	26.0	26.3	55.7	16.0	17.4	2.8	1.2	6.6
All hhds no child	34.9	4.5	38.5	15.2	5.0	9.2	27.8	27.3	57.1	18.1	19.8	5.4	2.7	8.4
Single parents	48.2	22.9	64.8	48.9	25.8	29.9	48.6	50.0	79.9	31.8	36.7	12.5	6.7	32.4
2 adults, 1 child	19.1	7.5	39.7	14.4	3.3	11.1	17.8	21.0	46.5	13.4	13.6	3.4	1.6	8.0
2 adults, 2 children	20.8	4.5	41.1	16.1	2.5	6.8	20.4	25.5	54.6	10.6	14.3	3.6	0.9	10.5
2 adults, 3+ children	32.1	4.1	61.4	28.8	4.1	23.3	37.4	45.1	82.0	12.6	25.7	6.8	3.4	16.5
Other hhds + children	32.6	7.6	50.5	23.6	3.1	6.8	25.3	33.4	68.9	15.3	22.4	3.0	2.5	10.0
All hhds + children	27.5	6.9	48.3	21.2	4.9	12.1	24.8	29.1	62.6	13.8	19.5	5.2	2.5	13.9
Degree of urbanisation (population density of the area)														
Densely populated	28.8	6.9	38.2	18.2	:	16.0	22.6	28.7	52.1	:	15.4	4.6	3.0	12.5
Intermediate	:u	5.3	46.3	21.4	:	8.8	25.1	28.4	60.2	:	20.4	5.3	2.3	7.6
Thinly populated	31.8	4.6	46.8	:u	:	6.9	29.6	27.5	65.4	:	21.7	5.7	2.5	9.5
Work intensity (WI)														
Very low WI	71.0	19.7	74.8	45.4	25.0	44.0	57.1	60.0	79.4	43.9	63.8	34.7	21.0	47.5
Low WI	64.6	22.0	71.7	33.8	11.4	23.7	43.4	43.2	79.4	33.0	40.5	9.4	8.5	22.5
Medium WI	45.1	7.3	48.3	20.0	3.8	14.9	34.8	35.4	67.5	23.9	26.2	5.8	3.8	12.0
High WI	32.3	5.4	44.4	13.8	2.9	9.5	25.2	32.3	63.4	15.9	20.0	3.4	1.2	8.6
Very high WI	16.6	2.9	33.4	9.1	2.9	3.8	13.8	16.2	49.4	9.9	11.5	1.4	0.6	3.6

Table A13: Incidence of MD 7+ broken down by sex, age, poverty risk, household type, degree of urbanisation and household work intensity, by country, whole population, 2009, (%)

MD 7+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Total	9.2s	6.1	44.9	5.5	1.8	7.5	5.7	4.9	8.1	4.3	6.8	6.0	3.9	25.5
Sex														
Female	9.6s	6.6	46.2	5.9	1.9	7.9	5.9	5.2	8.5	4.2	7.7	6.1	4.3	25.6
Male	8.8s	5.6	43.6	5.1	1.7	7.2	5.5	4.5	7.7	4.4	6.0	5.9	3.5	25.3
Age														
0-17 years	11.1s	7.5	47.7	6.8	2.5	10.0	7.5	6.9	8.8	6.1	8.6	8.0	3.7	29.6
18-49 years	9.1s	6.1	40.0	5.3	2.2	7.9	5.3	4.6	7.0	4.3	7.1	6.3	3.7	23.5
50-64 years	9.0s	5.8	43.1	5.6	1.4	8.0	6.0	4.3	7.1	3.9	5.9	4.7	4.0	27.2
65 years or more	7.4s	4.5	57.3	4.5	0.6	4.2	4.7	1.8	10.9	2.6	4.8	4.7	4.9	24.6
Poverty risk														
Non-poor	6.0s	3.0	34.5	3.4	1.2	3.9	3.2	3.2	3.5	2.3	4.1	3.6	2.3	17.9
Poor	25.6s	23.9	82.2	27.9	6.1	27.2	16.2	14.2	26.7	12.7	25.5	16.7	11.8	47.2
Household type														
Single less 65	11.2s	13.0	45.7	9.2	3.3	14.2	7.2	8.1	6.1	4.2	10.1	6.0	5.5	28.3
Single 65 or more	8.7s	7.6	62.9	7.0	0.7	7.7	5.0	2.9	13.8	3.4	7.1	5.4	8.5	25.2
Single male	9.2s	10.9	44.9	7.0	3.0	12.4	6.4	7.6	7.7	3.7	7.2	4.8	5.4	29.0
Single female	10.9s	10.9	62.9	8.9	2.1	11.8	6.2	3.6	10.6	3.9	10.2	6.3	8.0	25.7
Single all	10.2s	10.9	57.0	8.2	2.5	12.1	6.3	5.5	9.5	3.8	8.9	5.7	6.9	26.8
2 adults no child	7.0s	3.3	44.8	4.9	0.7	4.2	4.6	3.0	7.6	3.1	4.9	4.7	5.2	25.1
All hhds no child	7.8s	5.7	46.6	5.6	1.5	6.8	5.1	3.6	7.9	3.2	6.1	4.9	5.5	25.5
Single parents	19.7s	19.1	62.6	22.3	8.2	24.7	9.8	18.7	18.3	14.3	21.4	12.3	17.7	39.0
2 adults, 1 child	7.0s	5.8	36.4	3.9	1.1	5.2	4.3	2.8	8.6	4.5	4.3	4.9	3.5	18.0
2 adults, 2 children	6.5s	3.7	35.9	2.2	0.9	6.6	4.8	4.3	6.8	3.4	4.8	5.1	1.7	24.0
2 adults, 3+ children	12.0s	5.1	82.7	10.0	1.7	7.9	10.8	3.6	9.3	10.7	6.9	14.2	1.8	42.7
Other hhds + children	15.2s	4.7	45.5	5.0	1.0	5.2	6.5	2.6	11.2	7.4	8.8	8.3	2.3	24.1
All hhds + children	10.4s	6.5	43.6	5.5	2.2	8.4	6.3	5.6	8.4	5.3	7.4	7.1	3.0	25.4
Degree of urbanisation (population density of the area)														
Densely populated	8.7s	7.6	36.3	5.3	2.2	7.8	5.3	5.9	7.6	4.5	8.3	6.3	4.4	24.5
Intermediate	6.5s	4.2	55.1	6.5	1.7	6.4	:u	4.7	5.2	4.2	5.9	6.1	3.9	:u
Thinly populated	14.1s	5.7	51.0	5.2	1.5	9.1	6.1	4.1	9.3	3.9	4.9	4.9	2.7	26.4
Work intensity (WI)														
Very low WI	29.9s	28.7	86.3	30.1	11.6	36.4	31.4	18.8	19.4	21.3	30.2	19.1	24.3	63.9
Low WI	20.2s	11.6	80.1	25.8	11.4	13.6	18.5	8.8	18.4	11.6	19.7	12.4	9.3	58.0
Medium WI	10.6s	6.8	59.5	5.6	1.1	5.7	6.1	1.1	10.3	4.5	9.1	7.0	2.7	32.1
High WI	7.5s	2.7	35.8	4.5	2.4	5.1	5.8	1.4	5.6	3.7	6.8	5.4	3.1	29.4
Very high WI	4.7s	1.6	26.0	2.3	0.5	3.2	2.6	0.3	3.1	1.4	2.6	2.5	2.2	14.1

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A13 (continued):

MD 7+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Total	18.4	2.6	26.4	7.0	1.9	5.5	13.5	16.1	40.0	7.0	9.1	1.8	0.9	4.4
Sex														
Female	18.8	2.9	26.8	7.4	2.0	5.8	13.8	16.4	40.4	7.2	9.5	1.9	1.2	4.6
Male	17.9	2.3	25.9	6.6	1.8	5.1	13.1	15.7	39.6	6.8	8.7	1.8	0.7	4.0
Age														
0-17 years	19.1	3.7	33.2	9.1	2.3	7.1	14.5	19.9	47.9	6.4	12.5	1.7	1.0	6.1
18-49 years	16.4	3.0	26.7	6.4	2.1	5.2	12.0	14.8	37.9	6.5	8.4	1.8	1.1	4.6
50-64 years	20.6	1.3	24.9	6.7	1.8	5.9	16.0	14.1	37.2	8.9	7.2	2.3	1.0	3.6
65 years or more	21.0	1.3	18.8	6.3	1.1	3.9	13.4	17.5	40.4	6.9	10.2	1.5	0.6	1.9
Poverty risk														
Non-poor	12.3	1.0	21.9	5.1	1.0	2.6	9.0	11.4	33.4	5.0	6.3	1.0	0.6	2.5
Poor	41.9	11.5	57.9	17.9	9.1	26.3	35.0	37.6	62.9	22.7	32.3	7.0	2.9	13.1
Household type														
Single less 65	26.0	2.8	31.0	10.5	5.0	7.3	21.2	19.1	37.5	20.4	15.1	4.7	2.2	8.2
Single 65 or more	23.8	0.5	20.4	6.6	1.3	6.3	15.0	18.8	42.4	9.5	11.7	3.2	1.2	2.3
Single male	28.0	1.9	26.2	5.5	4.2	6.2	19.5	14.7	35.7	14.6	14.3	4.0	1.4	5.7
Single female	23.4	2.3	25.5	10.1	3.5	7.5	17.1	20.9	42.6	14.6	13.1	4.3	2.2	5.5
Single all	24.8	2.1	25.7	8.3	3.8	6.9	17.9	18.9	40.3	14.6	13.4	4.2	1.8	5.6
2 adults no child	19.1	1.4	21.0	5.5	1.0	4.2	13.3	13.8	34.4	6.9	6.7	0.9	0.5	2.2
All hhds no child	20.7	1.6	22.0	5.9	1.9	5.0	14.3	14.5	35.5	8.2	8.1	2.1	1.0	3.1
Single parents	35.5	12.4	43.6	27.7	8.9	17.7	33.4	31.5	61.8	17.4	18.3	4.7	2.7	12.6
2 adults, 1 child	11.1	3.8	23.2	6.0	0.4	4.0	9.5	12.6	28.7	4.9	6.8	0.9	0.6	3.2
2 adults, 2 children	11.3	1.8	24.1	5.8	0.6	3.6	10.2	14.1	32.0	4.7	6.1	1.1	0.3	3.2
2 adults, 3+ children	17.8	1.5	42.6	11.9	3.1	11.9	19.3	27.1	64.8	6.3	13.5	1.9	1.4	6.7
Other hhds + children	20.3	4.7	30.0	7.0	1.9	3.2	12.2	21.0	48.9	6.8	12.2	0.4	0.5	5.6
All hhds + children	16.8	3.4	29.9	7.9	1.9	5.9	12.7	17.4	42.9	6.2	9.9	1.6	0.9	5.5
Degree of urbanisation (population density of the area)														
Densely populated	16.2	3.3	23.1	7.1	:	8.8	12.0	17.4	33.6	:	7.5	1.5	0.9	5.1
Intermediate	:u	2.3	28.9	5.9	:	3.7	11.8	15.4	44.7	:	8.9	1.9	1.0	1.7
Thinly populated	20.0	1.5	27.5	:u	:	3.6	15.2	14.5	43.7	:	10.4	1.9	0.9	4.3
Work intensity (WI)														
Very low WI	58.8	9.5	59.0	24.7	14.8	26.1	39.2	45.3	58.9	28.6	44.9	14.4	8.9	20.5
Low WI	51.8	9.7	49.7	14.7	2.1	15.2	28.6	26.0	64.3	16.4	21.1	3.3	3.0	8.5
Medium WI	24.5	3.8	29.8	5.8	0.9	7.0	18.0	19.0	45.7	9.2	10.6	0.8	1.1	4.9
High WI	16.3	2.3	24.6	4.3	0.9	4.6	11.5	20.0	42.8	7.4	9.5	1.1	0.3	3.4
Very high WI	9.1	1.0	17.0	2.5	0.9	1.3	5.7	7.4	29.7	4.0	4.5	0.4	0.3	0.9

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A14: Distribution of people suffering from MD 5+ by sex, age, poverty risk, household type, degree of urbanisation and household work intensity, by country, whole population, 2009, (%)

MD 5+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Sex														
Female	54.1s	55.7	53.5	56.5	57.4	54.6	53.9	52.9	53.6	52.2	56.5	54.3	55.1	57.0
Male	45.9s	44.3	46.5	43.5	42.6	45.4	46.1	47.1	46.4	47.8	43.5	45.7	44.9	43.0
Age														
0-17 years	21.4s	28.2	14.7	21.8	28.8	24.6	25.1	37.6	19.1	24.6	30.0	21.2	19.0	19.6
18-49 years	40.4s	42.5	36.3	37.1	45.6	43.7	42.2	38.1	37.6	44.9	42.7	43.7	38.9	37.8
50-64 years	20.4s	18.6	22.9	22.2	15.7	20.0	17.7	16.2	17.6	16.0	15.5	16.6	21.3	20.0
65 years or more	17.8s	10.7	26.1	19.0	9.9	11.7	14.9	8.1	25.7	14.5	11.8	18.5	20.9	22.6
Poverty risk														
Non-poor	63.1s	47.5	64.4	72.1	75.5	55.0	48.6	64.9	48.9	52.9	61.1	54.4	53.6	54.6
Poor	36.9s	52.5	35.6	27.9	24.5	45.0	51.4	35.1	51.1	47.1	38.9	45.6	46.4	45.4
Household type														
Single less 65	6.0s	15.0	2.9	9.7	15.4	15.2	5.1	8.0	4.4	3.0	9.6	5.1	3.6	5.6
Single 65 or more	5.9s	5.3	7.6	9.7	5.5	4.8	4.7	4.2	7.1	3.3	5.9	5.8	5.1	7.9
2 adults no child	32.4s	19.8	41.5	30.2	19.0	26.6	27.9	19.6	39.3	32.4	21.3	33.7	40.8	34.3
Single parents	7.4s	19.9	1.7	15.0	23.9	15.4	10.6	26.8	3.4	4.9	16.4	5.9	5.7	7.0
2 adults. 1 child	9.2s	9.4	7.7	9.2	9.1	9.2	10.2	7.5	10.1	10.3	8.3	10.7	9.9	9.9
2 adults. 2 children	11.6s	11.4	7.7	10.6	11.0	14.8	10.0	9.4	15.0	14.4	13.8	14.7	11.4	9.1
2 adults. 3+ children	8.8s	12.5	2.4	7.6	8.8	9.2	11.8	17.5	7.6	8.0	15.0	8.5	10.3	6.7
Other hhds + children	18.2s	6.4	28.3	7.8	6.0	4.7	19.1	7.0	12.4	23.8	9.0	15.5	13.3	19.1
Degree of urbanisation (population density of the area)														
Densely populated	37.9s	67.8	35.6	27.5	35.7	47.1	27.3	32.9	33.9	50.6	51.9	40.4	48.2	44.9
Intermediate	16.7s	28.3	7.6	28.1	39.8	33.1	0.0	33.4	9.1	23.5	30.8	39.8	19.9	0.0
Thinly populated	45.5s	3.9	56.9	44.3	24.5	19.9	72.7	33.6	57.1	25.8	17.3	19.8	31.9	55.1
Work intensity (WI)														
Very low WI	15.8s	40.8	7.8	15.9	27.2	26.6	16.6	50.6	8.7	17.9	21.9	17.3	12.0	10.5
Low WI	9.3s	9.3	9.0	5.8	9.1	8.5	9.8	15.4	10.7	15.3	10.0	14.7	9.0	6.1
Medium WI	15.4s	13.2	11.2	15.4	12.1	15.4	13.5	10.7	21.0	17.6	17.0	20.7	12.1	11.7
High WI	14.0s	8.9	12.5	9.0	12.1	18.2	18.4	6.5	11.7	16.6	13.0	10.4	19.6	17.0
Very high WI	21.3s	11.4	24.4	26.8	23.6	13.9	21.9	3.8	15.2	13.2	21.9	12.9	20.3	25.9
Not applicable: no adult 60+	24.3s	16.5	35.2	27.1	15.9	17.4	19.7	13.1	32.7	19.3	16.2	24.0	27.0	28.8

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A14 (continued):

MD 5+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Sex														
Female	55.1	52.6	54.6	52.6	57.3	56.3	53.2	54.3	52.7	52.8	55.1	52.3	54.0	54.1
Male	44.9	47.4	45.4	47.4	42.7	43.7	46.8	45.7	47.3	47.2	44.9	47.7	46.0	45.9
Age														
0-17 years	16.1	37.9	22.7	24.5	27.8	28.4	22.3	18.8	16.3	16.3	22.2	24.1	26.7	33.3
18-49 years	34.1	47.5	42.7	40.0	39.1	41.0	39.0	36.8	38.4	46.5	46.3	42.3	45.0	41.5
50-64 years	24.3	12.3	21.6	22.4	23.1	17.4	23.5	19.8	22.0	22.5	17.5	23.2	18.3	16.1
65 years or more	25.5	2.4	12.9	13.1	9.9	13.2	15.2	24.6	23.3	14.7	14.1	10.4	10.0	9.0
Poverty risk														
Non-poor	67.2	32.8	77.4	67.8	70.2	55.7	60.7	64.5	69.7	76.5	68.8	53.0	61.4	57.1
Poor	32.8	67.2	22.6	32.2	29.8	44.3	39.3	35.5	30.3	23.5	31.2	47.0	38.6	42.9
Household type														
Single less 65	5.4	6.5	5.8	3.3	21.4	11.9	4.1	2.7	5.0	3.4	4.7	20.3	16.9	9.8
Single 65 or more	7.3	1.2	5.0	3.3	4.2	6.9	4.7	5.8	8.1	2.6	5.0	5.8	6.1	3.8
2 adults no child	41.5	14.9	28.4	30.3	19.4	22.6	30.6	40.3	38.0	35.8	26.7	21.6	17.6	20.7
Single parents	6.3	17.6	6.4	7.0	24.7	13.6	5.2	4.5	2.7	4.8	4.2	12.6	13.7	22.3
2 adults. 1 child	7.9	10.6	11.5	7.7	6.5	11.3	7.9	9.4	10.2	8.2	5.9	10.1	9.5	7.7
2 adults. 2 children	7.9	20.8	13.4	16.1	12.4	10.3	11.4	11.4	9.1	12.9	10.5	11.7	7.8	15.2
2 adults. 3+ children	6.5	18.5	12.4	9.1	7.4	18.7	10.2	5.9	5.4	6.1	10.8	14.8	18.1	13.3
Other hhds + children	17.2	10.0	17.1	23.1	4.2	4.7	25.8	19.6	21.3	26.2	32.2	3.0	7.3	6.5
Degree of urbanisation (population density of the area)														
Densely populated	43.6	57.8	25.4	87.6	:	49.0	29.2	34.2	28.6	:	20.5	19.6	22.2	85.4
Intermediate	0.0	20.2	20.1	12.4	:	21.0	14.4	36.4	1.1	:	34.5	15.1	15.6	12.1
Thinly populated	56.4	22.1	54.5	0.0	:	30.0	56.4	29.5	70.3	:	45.0	65.3	62.1	2.5
Work intensity (WI)														
Very low WI	11.2	18.8	17.0	18.8	23.3	22.8	13.7	10.7	9.0	10.4	15.8	36.8	36.4	39.7
Low WI	7.2	14.6	9.9	12.8	7.4	10.4	10.6	8.0	6.0	6.4	7.8	7.9	11.0	7.6
Medium WI	10.4	26.1	16.7	26.1	9.4	18.0	18.3	13.8	14.8	14.8	12.3	12.0	14.4	13.0
High WI	13.9	23.1	12.5	12.5	23.4	16.9	16.4	15.1	10.9	17.4	18.7	12.0	13.2	14.4
Very high WI	23.8	13.3	24.7	9.7	19.0	13.2	19.4	20.8	28.8	31.0	26.1	12.9	8.3	10.6
Not applicable: no adult 60+	33.5	4.1	19.2	20.1	17.6	18.5	21.6	31.6	30.5	20.0	19.4	18.5	16.6	14.7

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A15: Distribution of people suffering from MD 7+ by sex, age, poverty risk, household type, degree of urbanisation and household work intensity, by country, whole population, 2009, (%)

MD 7+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Sex														
Female	54.2s	55,7	53,8	57,1	56,9	54,4	54,3	53,8	53,9	52,3	57,6	53,7	58,1	56,3
Male	45.8s	44,3	46,2	42,9	43,1	45,6	45,7	46,2	46,1	47,7	42,4	46,3	41,9	43,7
Age														
0-17 years	22.2s	29,1	15,6	23,8	35,4	24,8	28,3	38,5	20,0	28,9	31,0	23,0	20,4	22,1
18-49 years	39.7s	42,6	35,1	37,8	45,1	43,3	40,7	39,2	36,3	44,8	41,5	44,0	37,1	38,1
50-64 years	20.8s	17,9	22,6	22,8	14,6	21,4	19,2	15,5	18,0	15,9	17,2	16,1	21,0	20,1
65 years or more	17.3s	10,4	26,7	15,6	4,9	10,5	11,7	6,8	25,7	10,5	10,3	16,9	21,6	19,6
Poverty risk														
Non-poor	56.2s	42,3	57,6	61,7	72,9	48,0	37,5	60,4	32,9	38,8	51,8	47,9	43,7	47,5
Poor	43.8s	57,7	42,4	38,3	27,1	52,0	62,5	39,6	67,1	61,2	48,2	52,1	56,3	52,5
Household type														
Single less 65	6.3s	15,0	2,9	9,7	15,4	15,2	5,1	8,0	4,4	3,0	9,6	5,1	3,6	5,6
Single 65 or more	5.6s	5,3	7,6	9,7	5,5	4,8	4,7	4,2	7,1	3,3	5,9	5,8	5,1	7,9
2 adults no child	31.6s	19,8	41,5	30,2	19,0	26,6	27,9	19,6	39,3	32,4	21,3	33,7	40,8	34,3
Single parents	8.1s	19,9	1,7	15,0	23,9	15,4	10,6	26,8	3,4	4,9	16,4	5,9	5,7	7,0
2 adults, 1 child	8.8s	9,4	7,7	9,2	9,1	9,2	10,2	7,5	10,1	10,3	8,3	10,7	9,9	9,9
2 adults, 2 children	10.7s	11,4	7,7	10,6	11,0	14,8	10,0	9,4	15,0	14,4	13,8	14,7	11,4	9,1
2 adults, 3+ children	9.1s	12,5	2,4	7,6	8,8	9,2	11,8	17,5	7,6	8,0	15,0	8,5	10,3	6,7
Other hhds + children	19.3s	6,4	28,3	7,8	6,0	4,7	19,1	7,0	12,4	23,8	9,0	15,5	13,3	19,1
Degree of urbanisation (population density of the area)														
Densely populated	37.1s	70,1	33,7	28,4	35,4	48,4	26,8	36,1	33,3	54,1	53,4	40,0	56,3	43,0
Intermediate	15.4s	26,0	7,9	30,9	47,2	32,2	0,0	33,3	10,5	21,1	32,0	41,6	16,2	0,0
Thinly populated	47.5s	3,9	58,4	40,8	17,4	19,3	73,2	30,6	56,1	24,8	14,5	18,3	27,5	57,0
Work intensity (WI)														
Very low WI	19.5s	46,1	9,9	24,2	31,9	35,8	26,7	61,1	12,5	26,8	29,0	23,1	18,0	14,6
Low WI	10.7s	7,5	11,0	7,8	13,2	8,7	11,2	15,5	12,4	18,7	11,2	14,4	15,3	8,0
Medium WI	14.9s	13,9	12,3	14,0	6,3	10,9	15,0	6,6	21,5	17,5	17,5	20,3	6,9	12,2
High WI	13.0s	7,4	11,1	8,2	16,7	15,4	16,9	4,0	9,3	13,4	12,3	9,6	14,7	17,9
Very high WI	18.2s	9,7	19,7	21,9	21,5	12,9	14,2	1,6	12,6	9,1	15,5	10,5	18,9	21,4
Not applicable: no adult 60+	23.7s	15,4	36,0	23,9	10,4	16,3	16,0	11,3	31,8	14,5	14,5	22,1	26,3	25,9

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A15 (continued):

MD 7+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Sex														
Female	55.0	52.6	54.5	54.0	60.4	56.6	53.2	53.4	52.7	52.2	54.9	53.4	61.1	55.7
Male	45.0	47.4	45.5	46.0	39.6	43.4	46.8	46.6	47.3	47.8	45.1	46.6	38.9	44.3
Age														
0-17 years	18.0	36.3	24.2	25.9	29.8	26.8	23.5	20.3	17.7	16.7	25.6	21.7	29.2	33.9
18-49 years	35.2	50.1	42.6	38.9	40.4	42.6	38.0	37.5	38.0	46.7	46.5	40.2	42.4	42.4
50-64 years	23.1	11.4	22.0	22.1	23.0	18.4	24.7	19.0	21.4	23.1	14.9	28.1	20.1	16.1
65 years or more	23.8	2.2	11.2	13.1	6.8	12.1	13.8	23.2	22.9	13.5	13.0	10.0	8.3	7.7
Poverty risk														
Non-poor	58.5	28.7	70.9	60.5	56.2	46.7	52.2	58.3	65.1	67.8	58.1	48.8	61.1	47.5
Poor	41.5	71.3	29.1	39.5	43.8	53.3	47.8	41.7	34.9	32.2	41.9	51.2	38.9	52.5
Household type														
Single less 65	5.4	6.5	5.8	3.3	21.4	11.9	4.1	2.7	5.0	3.4	4.7	20.3	16.9	9.8
Single 65 or more	7.3	1.2	5.0	3.3	4.2	6.9	4.7	5.8	8.1	2.6	5.0	5.8	6.1	3.8
2 adults no child	41.5	14.9	28.4	30.3	19.4	22.6	30.6	40.3	38.0	35.8	26.7	21.6	17.6	20.7
Single parents	6.3	17.6	6.4	7.0	24.7	13.6	5.2	4.5	2.7	4.8	4.2	12.6	13.7	22.3
2 adults. 1 child	7.9	10.6	11.5	7.7	6.5	11.3	7.9	9.4	10.2	8.2	5.9	10.1	9.5	7.7
2 adults. 2 children	7.9	20.8	13.4	16.1	12.4	10.3	11.4	11.4	9.1	12.9	10.5	11.7	7.8	15.2
2 adults. 3+ children	6.5	18.5	12.4	9.1	7.4	18.7	10.2	5.9	5.4	6.1	10.8	14.8	18.1	13.3
Other hhds + children	17.2	10.0	17.1	23.1	4.2	4.7	25.8	19.6	21.3	26.2	32.2	3.0	7.3	6.5
Degree of urbanisation (population density of the area)														
Densely populated	40.8	59.6	25.5	91.1	:	54.7	29.4	37.1	28.5	:	21.2	19.2	20.1	89.6
Intermediate	0.0	20.7	21.1	8.9	:	18.0	13.6	34.8	1.3	:	32.1	15.3	17.4	7.3
Thinly populated	59.2	19.7	53.4	0.0	:	27.3	57.0	28.1	70.1	:	46.6	65.5	62.5	3.1
Work intensity (WI)														
Very low WI	15.2	20.7	22.2	25.7	36.2	24.8	17.7	13.6	10.2	16.3	24.0	46.6	43.1	47.7
Low WI	10.1	17.3	11.5	15.0	5.5	12.4	13.2	9.0	7.6	7.1	9.5	7.1	10.4	7.2
Medium WI	9.7	23.8	17.5	20.4	8.1	18.4	18.0	13.5	15.5	12.2	10.7	8.9	9.0	12.5
High WI	13.3	22.9	11.3	10.6	21.7	16.7	15.4	16.0	10.8	18.4	18.6	11.0	11.8	13.3
Very high WI	20.9	11.7	20.3	7.5	14.5	9.0	15.7	17.7	26.3	27.2	20.5	6.4	10.4	6.8
Not applicable: no adult 60+	30.8	3.6	17.2	20.8	14.0	18.6	20.0	30.2	29.7	18.8	16.9	19.9	15.3	12.5

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Annex 8.b: Child population

Table A16: Incidence of Child MD 3+ broken down by age, poverty risk, household type, degree of urbanisation and household work intensity, by country, child population, 2009, (%)

MD 3+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
TOTAL	21.2s	18.6	70.5	20.1	6.5	14.6	20.5	22.7	30.7	19.1	17.9	17.2	17.9	44.8
Age														
0-5 years	19.4s	20.6	67.1	17.3	6.4	15.4	17.5	23.1	27.8	17.1	16.1	17.5	19.2	45.0
6-11 years	21.6s	17.5	70.5	21.7	5.6	15.1	22.7	23.4	29.9	19.2	19.2	17.3	18.6	44.2
12-15 years	22.0s	17.5	74.2	21.6	8.0	12.8	22.0	21.1	36.2	21.9	18.3	16.7	15.7	45.5
Poverty risk														
Non-poor	14.5s	10.7	62.7	14.3	3.9	9.9	14.2	16.0	20.1	12.5	11.2	10.1	14.3	34.9
Poor	47.8s	60.2	94.6	58.5	27.4	43.0	44.6	52.9	64.4	40.1	50.5	39.2	44.8	73.7
Household type														
Single parents	35.4s	41.1	87.7	53.5	19.0	41.1	38.4	50.4	46.4	34.1	37.1	23.2	44.6	61.0
2 adults, 1 child	14.1s	10.1	57.9	15.4	4.6	7.6	10.1	10.5	28.3	16.2	9.6	10.7	19.6	34.9
2 adults, 2 children	13.7s	8.2	62.4	10.7	2.1	9.6	12.0	11.9	28.3	14.3	9.0	13.1	14.3	38.1
2 adults, 3+ children	23.1s	20.1	90.2	28.3	6.2	13.2	32.6	20.3	37.8	31.6	20.9	27.0	21.8	62.4
Other hhds + children	36.5s	22.9	75.7	30.6	2.3	16.9	26.2	16.6	46.4	34.1	30.9	26.2	16.5	42.1
All hhds + children	20.9s	18.6	70.5	20.1	6.5	14.6	20.5	22.7	30.7	19.1	17.7	17.2	17.9	44.8
Degree of urbanisation (population density of the area)														
Densely populated	20.4s	24.4	58.7	16.3	10.9	15.8	21.2	23.7	28.4	19.9	23.4	18.1	15.7	39.5
Intermediate	16.0s	11.7	79.4	19.5	4.9	11.9	:u	26.5	20.5	20.2	12.7	17.7	17.3	:u
Thinly populated	30.2s	10.1	78.3	23.5	4.3	18.0	20.0	18.8	35.8	16.4	13.8	13.2	22.2	49.2
Work intensity (WI)														
Very low WI	54.7s	66.4	96.9	66.3	45.0	58.1	63.8	55.2	49.7	57.3	72.2	44.3	78.5u	80.2
Low WI	42.7s	45.2	91.5	57.2	38.2u	26.4	49.4	43.2	61.8	48.2	49.9	39.2	49.3	81.9
Medium WI	23.3s	24.0	75.4	17.7	8.5	10.1	20.4	8.5	40.4	21.1	24.2	21.6	28.3	48.6
High WI	15.2s	10.6	66.1	20.0	13.8	8.9	17.6	7.2	43.7	18.6	17.0	14.6	21.9	53.3
Very high WI	13.0s	6.4	61.5	12.2	1.6	7.9	14.9	4.9	16.7	9.0	7.2	7.2	10.0	32.5

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A16 (continued):

MD 3+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
TOTAL	28.5	6.7	49.2	21.0	6.6	12.5	29.1	40.4	78.3	13.4	25.5	6.7	3.4	10.6
Age														
0-5 years	24.5	7.8	46.1	18.0	5.9	11.2	24.4	37.4	75.1	11.4	26.4	6.9	3.1	11.0
6-11 years	29.1	6.4	50.9	22.5	6.9	13.2	30.2	41.1	80.2	15.0	26.4	7.3	3.3	9.6
12-15 years	32.3	5.8	50.0	21.8	7.2	13.2	32.7	42.6	78.9	13.4	23.8	5.6	4.2	11.2
Poverty risk														
Non-poor	20.5	2.9	41.1	15.4	3.4	7.1	20.2	32.0	70.0	10.5	18.8	4.1	1.9	7.3
Poor	53.7	20.9	79.5	43.8	23.9	46.7	59.0	69.9	95.1	36.0	58.2	26.7	14.2	23.9
Household type														
Single parents	51.4	29.3	66.2	48.5	34.2	23.6	53.9	57.2	88.4	26.7	40.2	15.6	10.9	26.6
2 adults, 1 child	17.2	4.7	38.1	13.3	3.3	7.3	13.3	26.7	59.0	9.5	15.5	2.0	1.0	4.1
2 adults, 2 children	21.2	3.2	36.1	15.5	2.5	6.1	19.7	33.8	79.2	9.5	17.4	3.8	1.0	5.3
2 adults, 3+ children	30.1	5.5	61.9	27.0	4.9	23.1	43.8	55.7	92.9	17.7	30.5	8.4	3.8	10.0
Other hhds + children	36.2	12.0	54.0	25.4	8.1	8.5	33.4	56.5	78.5	17.2	36.1	5.7	2.0	8.8
All hhds + children	28.5	6.7	49.2	21.0	6.6	12.5	28.8	40.4	78.2	13.4	25.5	6.7	3.5	10.5
Degree of urbanisation (population density of the area)														
Densely populated	21.1	7.9	41.0	20.4	:	22.8	23.9	39.4	65.4	:	21.9	5.2	5.7	11.9
Intermediate	:u	7.9	49.8	25.1	:	10.2	32.4	45.6	:u	:	25.4	7.7	1.6	5.9
Thinly populated	33.7	3.0	53.1	:u	:	4.4	32.0	34.6	84.5	:	27.4	7.0	3.2	6.9
Work intensity (WI)														
Very low WI	70.5	28.8	85.1	53.7	36.3	51.8	76.7	81.2	99.6	60.5	85.8	44.5	31.8	33.9
Low WI	67.1	17.8	80.8	36.6	15.3	34.3	49.5	67.8	92.8	34.4	53.9	7.7	9.0	14.6
Medium WI	35.1	5.6	49.7	19.8	7.7	12.4	34.9	50.8	89.2	30.6	30.1	8.0	4.6	10.7
High WI	34.3	4.5	43.2	15.5	3.6	9.7	35.1	55.5	81.6	18.0	25.6	7.9	1.5	4.6
Very high WI	18.1	6.0	31.9	10.6	4.7	2.9	16.9	24.9	66.7	8.5	16.5	1.9	1.4	2.7

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A17: Incidence of Child MD 6+ broken down by age, poverty risk, household type, degree of urbanisation and household work intensity, by country, child population, 2009, (%)

MD 6+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Total	9.4s	6.3	48.0	6.5	2.3	5.5	6.6	4.1	12.9	4.7	5.4	8.6	4.6	25.4
Age														
0-5 years	8.0s	6.2	37.5	5.4	2.1	5.3	6.6	6.3	11.4	4.0	4.4	8.8	3.6	24.5
6-11 years	9.8s	5.7	52.1	6.4	1.9	6.1	6.8	3.6	12.1	4.6	6.1	8.2	5.3	25.0
12-15 years	10.4s	7.3	53.9	7.9	3.1	5.0	6.5	2.1	16.5	5.8	5.6	8.8	4.7	26.9
Poverty risk														
Non-poor	5.4s	3.5	35.4	2.9	1.1	3.3	2.9	1.6	5.3	1.8	2.3	5.1	3.1	15.7
Poor	25.6s	20.7	86.4	29.6	11.9	19.2	21.0	15.0	37.2	13.9	20.0	19.3	15.6	53.5
Household type														
Single parents	13.8s	15.2	70.0	25.9	7.0	18.0	11.2	11.8	22.8	9.3	11.9	13.3	25.0	40.2
2 adults, 1 child	5.4s	4.2	35.1	3.0	0.8	2.6	3.1	0.9	13.3	4.4	1.6	4.3	4.2	11.8
2 adults, 2 children	5.3s	3.2	40.9	2.3	0.7	2.3	2.6	0.3	11.5	2.9	2.6	5.8	2.4	19.8
2 adults, 3+ children	11.4s	7.4	89.0	12.7	2.5	5.5	14.4	3.8	13.9	8.7	5.7	14.7	6.3	44.4
Other hhds + children	19.7s	0.7	48.9	5.6	0.0	8.7	8.0	3.4	21.5	10.0	12.2	14.4	3.1	23.4
All hhds + children	9.3s	6.3	47.8	6.5	2.3	5.5	6.6	4.1	12.9	4.7	5.2	8.6	4.6	25.3
Degree of urbanisation (population density of the area)														
Densely populated	8.1s	9.5	34.1	5.9	3.2	6.2	6.0	4.7	12.3	4.8	7.8	9.0	4.9	19.3
Intermediate	5.9s	2.2	61.1	5.7	2.4	3.9	:u	4.9	4.6	4.2	3.3	8.9	1.9	:u
Thinly populated	17.0s	4.7	56.7	7.3	1.1	7.5	7.2	2.9	15.9	5.0	2.9	6.5	5.5	30.3
Work intensity (WI)														
Very low WI	28.1s	28.9	84.3	42.9	24.5	32.6	32.9	13.8	26.3	27.8	27.6	30.0	54.0u	68.5
Low WI	22.5s	7.6	83.2	26.3	18.4u	5.0	17.0	4.5	29.0	18.1	23.9	22.8	2.7	61.2
Medium WI	9.8s	9.6	46.8	3.6	2.2	2.3	7.2	0.3	19.2	4.3	7.5	9.1	6.3	27.2
High WI	5.9s	2.1	43.5	1.9	1.6	3.4	6.9	0.2	15.6	3.0	2.8	7.8	3.5	31.6
Very high WI	5.3s	1.6	35.7	2.8	0.3	1.6	2.6	0.0	5.9	1.0	1.5	3.2	2.3	13.6

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A17 (continued):

MD 6+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Total	14.5	2.3	24.6	4.7	0.7	4.6	13.0	21.5	58.4	3.6	12.9	0.3	0.4	2.2
Age														
0-5 years	12.7	3.2	23.7	3.5	0.4	3.2	10.7	18.2	54.4	2.2	12.9	0.6	0.4	1.9
6-11 years	13.3	2.1	24.7	5.2	1.3	6.3	12.5	22.5	60.6	4.3	14.2	0.1	0.4	2.0
12-15 years	18.3	1.6	25.3	5.3	0.3	4.2	16.4	23.4	59.5	4.2	11.6	0.4	0.5	2.9
Poverty risk														
Non-poor	9.0	0.4	16.8	2.7	0.1	1.3	6.7	14.4	45.4	1.8	7.4	0.3	0.1	0.9
Poor	31.8	9.4	53.8	13.2	4.1	25.5	34.5	46.2	85.0	17.3	40.1	0.6	2.4	7.5
Household type														
Single parents	30.1	12.8	39.4	19.0	2.7	5.4	37.2	37.1	76.0	8.5	22.0	1.0	1.9	5.0
2 adults, 1 child	8.2	1.4	12.2	1.4	0.0	1.7	5.2	11.6	33.5	1.4	3.2	0.0	0.0	0.6
2 adults, 2 children	5.8	0.8	16.0	1.2	0.3	1.9	6.0	15.9	53.3	2.4	6.3	0.3	0.0	1.2
2 adults, 3+ children	17.7	2.1	34.8	7.9	0.7	11.1	23.4	36.5	80.1	6.5	18.3	0.4	0.3	2.8
Other hhds + children	23.2	3.1	27.1	8.2	2.3	2.7	13.7	30.9	61.7	3.3	21.9	0.0	0.0	0.5
All hhds + children	14.5	2.3	24.6	4.7	0.7	4.6	12.8	21.4	58.4	3.6	12.9	0.3	0.4	2.1
Degree of urbanisation (population density of the area)														
Densely populated	9.9	3.1	20.8	5.0	:	8.9	10.6	23.0	42.6	:	9.1	0.7	0.0	2.6
Intermediate	:u	1.5	24.9	2.3	:	2.9	14.2	23.7	:u	:	12.1	0.0	0.0	0.9
Thinly populated	17.7	1.7	26.4	:u	:	1.8	14.5	14.6	66.1	:	15.6	0.3	0.7	0.0
Work intensity (WI)														
Very low WI	57.8	14.1	59.4	24.2	10.0	23.5	53.4	63.1	95.0	33.8	71.5	2.0	2.5	9.9
Low WI	36.0	7.3	50.2	8.1	0.0	15.2	24.8	36.8	83.4	16.8	37.5	0.0	2.7	5.0
Medium WI	16.1	2.1	24.3	2.5	0.3	4.4	15.2	24.5	68.2	7.5	14.7	0.9	1.6	0.9
High WI	14.4	0.6	18.2	4.7	0.2	3.1	16.9	30.6	55.7	4.7	12.9	0.1	0.0	0.2
Very high WI	8.9	2.2	9.8	0.6	0.3	0.3	5.2	11.1	45.3	1.6	5.2	0.1	0.0	0.3

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A18: Distribution of children suffering from MD 3+ by age, poverty risk, household type, degree of urbanisation and household work intensity, by country, child population, 2009, (%)

MD 3+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Age														
0-5 years	27.4s	38.8	28.9	29.8	23.4	32.8	30.1	35.6	30.2	31.9	29.5	31.0	26.5	33.5
6-11 years	39.9s	37.0	36.7	38.8	39.6	42.9	36.5	41.8	40.9	40.0	41.9	39.5	38.6	37.0
12-15 years	32.7s	24.2	34.4	31.4	36.9	24.2	33.3	22.6	28.9	28.1	28.6	29.4	34.9	29.5
Poverty risk														
Non-poor	43.3s	42.6	63.9	67.1	69.4	59.1	46.3	59.9	49.7	44.1	52.2	43.6	66.0	53.6
Poor	56.7s	57.4	36.1	32.9	30.6	40.9	53.7	40.1	50.3	55.9	47.8	56.4	34.0	46.4
Household type														
Single parents	16.4s	35.4	5.3	30.5	33.3	37.4	17.5	46.3	7.1	10.6	29.1	13.1	12.7	16.4
2 adults. 1 child	7.9s	5.7	11.4	11.0	8.1	8.4	7.2	4.5	11.6	11.5	5.4	9.1	6.8	11.5
2 adults. 2 children	20.1s	17.4	22.9	23.9	18.0	30.3	15.3	10.8	36.4	29.2	17.6	33.9	25.0	21.9
2 adults. 3+ children	28.2s	31.9	8.3	21.8	35.1	19.6	36.0	31.0	27.0	20.2	37.7	24.9	38.9	24.1
Other hhds + children	26.9s	9.5	51.9	12.9	3.6	4.2	23.9	7.5	17.7	28.5	9.3	19.0	16.7	25.8
Degree of urbanisation (population density of the area)														
Densely populated	32.8s	72.28	32.2	22.6	45.05	42.6	24.9	33.2	34.2	49.4	57	40	40.4	35.1
Intermediate	15.9s	24.75	8.1	24	37.84	34.1	0	33.2	9.97	25.2	27.8	42.1	23.5	0
Thinly populated	51.3s	2.97	59.7	53.4	17.12	23.3	75.1	33.6	55.9	25.3	15.2	17.8	36.1	64.9
Work intensity (WI)														
Very low WI	24.3s	40.4	11.3	21.5	23.4	34.3	17.3	58.0	4.1	18.2	24.7	16.3	12.0	13.4
Low WI	13.7s	11.5	14.7	7.8	13.5	10.5	12.6	17.2	10.8	17.5	10.4	16.0	9.6	9.5
Medium WI	23.1s	21.8	16.4	24.4	19.8	20.4	22.0	11.8	39.4	27.6	27.6	39.6	24.4	17.1
High WI	15.0s	11.5	17.5	11.4	15.3	22.0	19.0	8.6	19.4	18.7	15.8	12.7	23.1	22.9
Very high WI	23.3s	14.9	39.2	34.9	27.9	12.8	28.4	4.3	26.0	17.5	21.4	15.3	30.9	36.3
Not applicable: no adult 60+	0.5s	0.0	0.9	0.0	0.0	0.0	0.6	0.2	0.3	0.5	0.1	0.2	0.0	0.7

Notes: see Table A12.

Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A18 (continued):

MD 3+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Age														
0-5 years	27.2	39.1	27.6	25.3	32.5	26.4	25.3	23.3	26.1	29.4	26.9	31.3	27.0	38.2
6-11 years	38.7	37.3	40.2	43.1	39.8	41.1	38.6	44.3	42.7	41.1	40.5	40.9	35.0	34.1
12-15 years	34.1	23.6	32.2	31.6	27.7	32.5	36.1	32.4	31.2	29.5	32.6	27.8	38.0	27.7
Poverty risk														
Non-poor	56.4	16.4	64.4	59.1	58.7	50.8	49.2	60.3	59.5	69.7	57.3	56.4	48.7	55.5
Poor	43.6	83.6	35.6	40.9	41.3	49.2	50.8	39.7	40.5	30.3	42.7	43.6	51.9	44.5
Household type														
Single parents	18.9	33.8	12.6	15.7	53.4	24.0	11.5	11.9	6.1	8.5	4.8	26.3	38.0	48.9
2 adults. 1 child	10.1	7.1	10.8	9.3	4.4	7.7	5.9	12.1	17.1	6.7	5.6	3.5	4.0	5.1
2 adults. 2 children	20.3	17.3	22.7	32.1	17.0	15.4	20.3	31.7	26.9	26.5	18.9	17.4	14.0	18.6
2 adults. 3+ children	22.5	31.1	35.6	21.7	21.4	45.5	30.0	16.0	19.5	25.4	25.6	49.0	40.0	22.4
Other hhds + children	28.2	10.7	18.3	21.2	3.9	7.3	33.2	28.2	30.4	33.0	45.0	3.9	4.0	4.8
Degree of urbanisation (population density of the area)														
Densely populated	36.7	60.0	21.6	85.7	0.0	59.8	24.1	35.6	23.0	0.0	17.1	15.4	33.7	88.7
Intermediate	0.0	19.1	19.4	14.3	0.0	22.4	18.7	42.2	0.4	0.0	36.7	17.0	8.3	9.5
Thinly populated	63.3	20.9	59.0	0.0	0.0	17.9	57.2	22.1	76.6	0.0	46.2	67.6	58.2	1.8
Work intensity (WI)														
Very low WI	14.8	22.2	23.6	25.3	21.4	26.8	12.9	12.6	6.8	9.7	21.4	29.0	40.0	51.9
Low WI	11.8	13.3	13.6	11.5	5.3	19.5	10.6	8.3	9.2	5.4	9.1	5.0	10.0	7.6
Medium WI	12.0	25.8	27.3	39.3	18.0	24.0	25.6	21.6	27.9	21.1	17.6	17.4	18.0	20.4
High WI	18.3	23.1	11.3	11.0	32.0	22.0	20.0	21.1	12.0	18.7	18.1	28.2	19.0	12.5
Very high WI	41.0	15.1	24.0	12.9	23.3	7.7	30.8	35.9	43.5	45.0	33.7	19.7	13.0	7.1
Not applicable: no adult 60+	2.2	0.4	0.3	0.0	0.0	0.0	0.1	0.5	0.7	0.0	0.0	0.8	0.0	0.5

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A19: Distribution of children suffering from MD 6+ by age, poverty risk, household type, degree of urbanisation and household work intensity, by country, child population, 2009, (%)

MD 6+	EU-27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV
Age														
0-5 years	27.4s	38.9	25.3	30.1	29.4u	29.8	30.1	41.4	25.7	31.4	26.4	30.4	21.5	31.9
6-11 years	39.9s	37.0	39.0	35.8	38.2u	44.2	35.4	36.9	41.3	39.6	44.9	37.2	41.8	36.8
12-15 years	32.7s	24.1	35.6	34.1	32.4u	26.0	34.4	21.6	33.0	29.0	28.7	32.3	36.7	31.3
Poverty risk														
Non-poor	43.3s	35.8	53.1	49.1	58.8u	48.6	28.2	44.1	27.9	23.8	35.4	40.9	49.4	41.3
Poor	56.7s	64.2	46.9	50.9	41.2u	51.4	71.8	55.9	72.1	76.2	64.6	59.1	50.6	58.7
Household type														
Single parents	16.4s	40.1	5.9	44.7	35.3u	44.2	15.3	51.4	8.7	10.9	33.1	14.9	30.4	18.8
2 adults. 1 child	7.9s	6.8	10.5	6.2	2.9u	8.3	5.3	3.6	11.2	7.7	3.1	6.8	5.1	7.5
2 adults. 2 children	20.1s	19.8	21.6	15.0	14.7u	21.5	9.6	3.6	35.8	19.4	16.5	29.4	15.2	19.7
2 adults. 3+ children	28.2s	31.5	11.3	25.7	47.1u	21.5	45.5	34.2	26.0	27.6	33.9	27.2	31.6	28.6
Other hhds + children	26.9s	1.9	50.3	8.4	0.0u	4.4	24.4	7.2	18.2	34.4	11.0	21.7	17.7	25.1
Degree of urbanisation (population density of the area)														
Densely populated	32.8s	82.7	29.2	25.7	41.2u	43.6	18.2	32.4	35.5	53.0	63.0	41.5	48.1	30.2
Intermediate	15.9s	13.0	8.7	25.2	47.1u	30.9	0.0	38.7	9.2	19.7	25.6	41.9	20.3	0.0
Thinly populated	51.3s	4.3	62.2	49.1	11.8u	25.4	81.8	28.8	55.3	27.3	11.4	16.6	31.6	69.8
Work intensity (WI)														
Very low WI	24.3s	54.3	14.0	42.5	38.2u	54.1	28.7	83.8	4.7	29.8	35.0	22.8	36.7	20.0
Low WI	13.7s	8.0	19.0	11.9	26.5u	6.1	11.5	9.0	15.6	21.3	15.0	18.9	7.6	11.5
Medium WI	23.1s	21.6	15.9	13.7	11.8u	14.4	19.6	2.7	40.8	26.5	28.3	33.6	16.5	16.6
High WI	15.0s	9.3	16.9	4.0	8.8u	17.7	22.5	4.5	15.4	13.4	7.5	11.7	13.9	24.0
Very high WI	23.3s	6.8	33.0	27.9	14.7u	7.7	17.2	0.0	23.2	8.7	13.8	12.8	25.3	27.0
Not applicable: no adult 60+	0.5s	0.0	1.2	0.0	0.0u	0.0	0.5	0.0	0.3	0.3	0.4	0.2	0.0	0.9

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Table A19 (continued):

MD 6+	LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK
Age														
0-5 years	26.5	37.0	28.5	20.2	:u	26.6	23.6	23.3	25.4	21.2	26.5	:u	:u	32.1
6-11 years	39.2	39.7	39.0	42.9	:u	51.1	37.3	44.1	42.9	45.9	41.5	:u	:u	32.1
12-15 years	34.2	23.3	32.5	36.9	:u	22.3	39.1	32.6	31.7	32.9	32.0	:u	:u	35.9
Poverty risk														
Non-poor	47.3	4.1	51.8	40.5	:u	24.5	35.1	51.0	51.2	47.3	44.6	:u	:u	32.1
Poor	52.7	95.9	48.2	59.5	:u	75.5	64.9	49.0	48.8	52.7	55.4	:u	:u	67.9
Household type														
Single parents	18.8	38.4	15.1	26.2	:u	20.2	16.0	14.5	7.0	11.6	4.9	:u	:u	44.9
2 adults. 1 child	9.6	2.7	6.9	4.8	:u	4.3	4.9	10.0	13.3	4.1	2.2	:u	:u	3.8
2 adults. 2 children	13.5	16.4	18.5	11.9	:u	12.8	15.5	27.2	24.1	21.2	12.9	:u	:u	19.2
2 adults. 3+ children	28.5	31.5	40.3	26.2	:u	58.5	31.7	19.4	23.4	38.4	28.9	:u	:u	28.2
Other hhds + children	29.6	11.0	19.2	31.0	:u	4.3	31.9	28.7	32.0	24.7	51.1	:u	:u	2.6
Degree of urbanisation (population density of the area)														
Densely populated	35.4	52.1	21.9	94.0	:	67.0	24.2	39.7	19.6	:	15.7	:u	:u	92.3
Intermediate	0.0	21.9	19.6	6.0	:	18.1	17.8	43.6	0.2	:	33.5	:u	:u	7.7
Thinly populated	64.6	26.0	58.5	0.0	:	14.9	58.0	16.7	80.2	:	50.8	:u	:u	0.0
Work intensity (WI)														
Very low WI	21.2	27.4	33.5	44.0	:u	37.2	18.3	17.4	8.6	23.3	32.9	:u	:u	76.9
Low WI	12.7	9.6	16.5	11.9	:u	23.4	12.2	9.1	11.2	8.9	12.6	:u	:u	7.7
Medium WI	12.7	23.3	25.3	25.0	:u	20.2	25.1	21.1	29.1	21.9	16.3	:u	:u	10.3
High WI	15.0	24.7	9.9	16.7	:u	16.0	22.2	20.8	11.9	14.4	17.2	:u	:u	2.6
Very high WI	36.5	15.1	14.5	2.4	:u	3.2	22.1	31.1	38.6	31.5	20.9	:u	:u	2.6
Not applicable: no adult 60+	1.9	0.0	0.3	0.0	:u	0.0	0.1	0.5	0.7	0.0	0.0	:u	:u	0.0

Notes: see Table A12.
Source: EU-SILC 2009 cross-sectional data, Users' database – August 2011, authors' computation.

Annex 9: Poverty and social exclusion in the UK survey: services module

SHOWCARD E1

I am now going to ask you about services which may exist in your local area. Using this 'showcard', can you tell me whether you (or a member of your household) have used these services in the last 12 months. For the services you use, please tell me whether you think they are adequate or inadequate. For the services you do not use, please tell me whether you do not use them because 'you don't want to' or because 'they are unavailable or inadequate' or because 'you can't afford to' use them.

UseLib

SHOWCARD E1

Do you, or a member of your household, use...

...libraries?

1. Use – adequate
2. Use – inadequate
3. Don't use – unavailable or inadequate
4. Don't use – don't want/not relevant
5. Don't use – can't afford

ALL ADULTS

UseLib – libraries

UseSpt - public sports facilities (e.g. swimming pools)

UseMusm - museums and galleries

UseEvCl - evening classes

UseVilg - a public or community village hall

UseDoc - a doctor

UseDent - a dentist

UseOpt - an optician

UsePost - a post office

UseCit - the Citizen's advice bureau or other advice services

UseChem - chemists

UseCnrs - a corner shop

UseMedS - medium to large supermarkets

UseBank - banks and building societies

UsePubH - a pub

UseBus - bus services

UseTrn - a train or tube station

PEOPLE AGED 65 AND OVER

UseHmHp - a home help / home care

UseWls - Meals on wheels

UseDay - Day Centres /lunch clubs/ social clubs

UseChir - a Chiropodist

UseSpBs - special transport for those with mobility problems

IF CHILDREN IN HOUSEHOLD (AGE OF CHILD FILTERED)

UsePlay - facilities to play safely nearby

UseScMl - school meals

UseYClb - youth clubs

UseSClb - after school clubs

UseScBs - public transport to get to school

UseNsry - nurseries, playgroups, mother and toddler groups

European Commission

Measuring material deprivation in the EU — Indicators for the whole population and child-specific indicators

Luxembourg: Publications Office of the European Union

2012 — 169 pp. — 21 x 29.7 cm

Theme: Populations and social conditions
Collection: Methodologies & Working papers

ISBN 978-92-79-25571-7
ISSN 1977-0375
doi:10.2785/33598
Cat. No KS-RA-12-018-EN-N