

Multiple Overlapping Deprivation Analysis for the European Union (EU-MODA)

Technical Note

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Office of Research Working Paper

WP-2014-01 | January 2014

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For readers wishing to cite this document we suggest the following form:

Chzhen, Y. and C. de Neubourg (2014). Multiple Overlapping Deprivation Analysis for the European Union (EU-MODA): Technical Note, *Innocenti Working Paper* No.2014-01, UNICEF Office of Research, Florence.

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ISSN: 1014-7837

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MULTIPLE OVERLAPPING DEPRIVATION ANALYSIS FOR THE EUROPEAN UNION (EU-MODA): TECHNICAL NOTE

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Abstract. The Multiple Overlapping Deprivation Analysis for the European Union (EU-MODA) compares the material well-being of children across the EU member states, using data from the child material deprivation module of the European Union Statistics on Income and Living Conditions (EU-SILC) 2009. Embedded in the multidimensional poverty measurement literature, EU-MODA applies internationally accepted standards for the construction of indicators and dimensions of child well-being. The analysis ranges from indicator and dimension headcounts, overlaps between several dimensions, decomposition of the adjusted multidimensional deprivation headcounts, to overlaps between monetary poverty and multidimensional deprivation. This technical note describes the EU-MODA methodology in detail.

Keywords: multidimensional poverty, child well-being, overlapping deprivations, EU-SILC.

JEL classification: I31, I32, J13.

Acknowledgements: the authors wish to thank their colleagues at the UNICEF Office of Research, especially Marlous de Milliano and Ilze Plavgo, for their useful comments and suggestions.

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INTRODUCTION

As part of UNICEF's focus on equity in child well-being, Multiple Overlapping Deprivation Analysis (MODA) seeks to identify the extent and nature of multidimensional deprivation experienced by children. Rooted in the multiple deprivation measurement tradition (see Atkinson 2003; Bourguignon and Chakravarty 2003; Gordon et al 2003; Alkire and Foster 2011), MODA uses the international framework of child rights to inform the construction of indicators and dimensions essential to children's welfare. It counts the number of children deprived in each indicator and dimension, as well as in several dimensions simultaneously, charts the degree of overlap between various dimensions, and analyses the profile of children suffering from several deprivations at once.

MODA is a versatile analytical and monitoring tool, developed by the UNICEF Office of Research with support from the Division of Policy and Strategy, which can be carried out as a single country study (National MODA) or as a comparative cross-country analysis (Cross-Country MODA). While N-MODA uses the indicators, dimensions and thresholds tailored to the context of a particular country, the cross-country application (CC-MODA) requires the use of identical (or, at least, comparable) indicators and dimensions across all the countries studied. The Multiple Overlapping Deprivation Analysis for the European Union (EU-MODA) is a special application of the MODA methodology (de Neubourg et al 2012a) to 27 EU member states plus Norway and Iceland. Similarly to CC-MODA for low- and middle-income countries (see de Neubourg et al 2012b¹), EU-MODA compares the living conditions of children across the EU member states, adding two extra levels of analysis that were not included in CC-MODA due to the lack of data: income poverty and the overlaps between income poverty and multidimensional deprivation.

The analysis is based on two major approaches in multidimensional poverty measurement: the Bristol method (Gordon et al 2003) and the Alkire-Foster method (Alkire and Foster 2011). In the first scientific study of the extent and nature of child poverty in all the developing world regions, Gordon et al (2003) counted the number of children in absolute poverty in 46 countries. They have grounded the measurement of child poverty in the international child rights framework, using the definition of absolute poverty agreed by 117 countries at the 1995 World Summit on Social Development in Copenhagen: "a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information" (United Nations, 1995). For each of these seven dimensions, they identified the thresholds of severe deprivation, i.e. "those circumstances that are likely to have serious adverse consequences for the health, well-being and development of children" (Gordon et al, 2003: 31). Absolute child poverty was then measured as the condition of children suffering from two or more different types of severe deprivations. They found that over a third (37%) of children in the developing world lived in absolute poverty and over half (56%) suffered from at least one form of severe deprivation, using data from the Demographic and Health Surveys. Their work became part of the UNICEF Global Study on Child Poverty and Disparities. Using internationally recognized children's rights to inform the construction of child deprivation dimensions and counting the number of children suffering from several deprivations to produce the deprivation headcount rate became known as the Bristol method.

¹ The CC-MODA results are available at <http://www.unicef-irc.org/MODA/>.

Building on the multidimensional poverty methodology proposed in Atkinson (2003) and Bourguignon and Chakravarty (2003), as well as Sen's (1979) capabilities approach to defining poverty, Alkire and Foster (2011) introduced a new class of poverty measures that, in addition to the incidence of poverty, reflect its intensity, depth and the inequality in its distribution. These measures can be decomposed to reflect the contribution of sub-group poverty levels (e.g. by ethnicity; geographic area) to the overall poverty rate. They can also be broken down to show the relative contribution of each dimension to the poverty rate within sub-groups or within the overall poverty rate. The Alkire-Foster method informed the construction of the global Multidimensional Poverty Index (MPI) (Alkire and Santos 2010) as well as the Inequality Adjusted Human Development Index (Alkire and Foster 2010) used in the 2010 Human Development Report (UNDP 2010). The Alkire-Foster methodology has also been applied to multiple national studies of multidimensional poverty.

Similarly to the Bristol approach, MODA uses the international children's rights framework to guide the choice of dimensions of deprivation and treats the child, rather than the household, as the unit of analysis. It recognizes that poverty and deprivation may affect children differently to adults. However, MODA differs from both the Bristol approach and the existing applications of the Alkire-Foster method, such as the MPI, as it distinguishes between the needs of children of different ages: early childhood, middle childhood and adolescence. It acknowledges that different dimensions may be relevant for children at various stages of their life cycle. At the same time, MODA uses the Alkire-Foster method to analyse the incidence and breadth of multidimensional child deprivation.²

To summarize, MODA contributes to the research in multidimensional child deprivation in the following ways:

- It focuses on the type and number of deprivations experienced simultaneously by each child rather than on the proportion of children deprived in each dimension (or sector) separately.
- It uses the child, rather than the household, as the unit of analysis.
- It distinguishes between the needs of children of different ages: early childhood, school age, and adolescence.
- It analyses the extent to which the background characteristics of children (and their households) are associated with the risk of multidimensional deprivation, helping inform effective policy design.
- It treats deprivation and income poverty as separate fields of well-being. Thus, none of the dimensions of deprivation are monetary measures.
- It analyses the overlaps between monetary poverty and multidimensional deprivation when income or consumption data are available (e.g. EU-MODA).

This technical note describes the EU-MODA methodology as an extension of MODA. First it defines the age groups, indicators, dimensions, thresholds and profiling variables used in the analysis. Then it outlines the main analytical techniques used in EU-MODA.

² The Alkire-Foster approach was not developed specifically for children (although see Roche (2013)); it uses the terminology of multidimensional poverty rather than deprivation.

EU-MODA: DIMENSIONS OF CHILD WELL-BEING

In line with the rights-based approach to selecting dimensions of child well-being, MODA uses international human rights standards to inform the choice of dimensions. Children’s rights enshrined in The Convention on the Rights of the Child (CRC) (1989), in conjunction with the World Summit on Social Development (1995) and the Millennium Development Goals (2000), guide the construction “of a core set of dimensions that are essential to any child’s development irrespective of their country of residence, socio-economic status, or culture” (de Neubourg et al, 2012: 6). Table 1 summarises the dimensions of child well-being grounded in the CRC along with the corresponding articles of the Convention.

Table 1 Child Well-being Dimensions According to the CRC

Categories	Dimensions	Source
Survival	Nutrition	CRC Art. 24
	Water and sanitation	CRC Art. 24
	Health care	CRC Art. 24
	Shelter, housing, clothing	CRC Art. 27
	Environment, pollution	CRC Art. 24
Development	Education	CRC Art. 28
	Leisure	CRC Art. 31
	Cultural activities	CRC Art. 31
	Information	CRC Art.13, 17
Protection	Exploitation, child labour	CRC Art. 32
	Other forms of exploitation	CRC Art. 33-36
	Cruelty, violence	CRC Art. 19, 37
	Violence at school	CRC Art. 28
	Social security	CRC Art 16, 26, 27
Participation	Birth registration; Nationality	CRC Art. 7,8
	Information	CRC Art.13,17
	Freedom of expression, views, opinions; Being heard; Freedom of association	CRC Art.12-15

Source: adapted from Table 1 in Cross-Country MODA Study Technical Note (de Neubourg et al, 2012).

The analysis of multiple deprivations at the level of the child necessitates the use of a single source of survey data. Conversely, sector-based analysis (e.g. the proportion of children deprived in each dimension separately) allows using data from different sources, but in doing so makes it impossible to evaluate the distribution of deprivations experienced by each child. EU-MODA is based on data from the 2009 round of the European Union Statistics on Income and Living Conditions (EU-SILC). It covers 27 EU member states as well as Norway and Iceland. The EU-SILC is the main source of information on living standards in the EU, collecting nationally representative and cross-country

comparable statistics on income and social inclusion.³ Although a new round of the EU-SILC is released approximately every year, the 2009 wave is the only one to date that contains measures of deprivation specific to children, rather than the household as a whole, in a special “material deprivation” module.⁴ However, children are not interviewed themselves: household members provide information on their behalf. Most of the 14 child-specific items available in the EU-SILC 2009 refer to children⁵ aged 1-15, apart from the two items related to school education that apply to school-age children only. The EU-SILC 2009 methodology specifies that if one child in the relevant age category lacks an item, all children in the household are flagged as lacking this item. Thus, questions are asked of all children in the household as a group, rather than about each individual child. This makes it impossible to study differences between children in the same household and may lead to an upward bias in the estimated child deprivation rates (for example, if one child in the household is deprived but another is not, both are counted as deprived in the EU-SILC).⁶ In contrast, adolescents aged 17-18 are interviewed individually as adult respondents.

Following the life-cycle approach, but subject to data constraints, EU-MODA uses three distinct age-groups: preschool age children (those between the age of one and the national minimum compulsory school age⁷); school-age children under 16; and adolescents aged 17-18.⁸ This recognizes that different dimensions are relevant for children at various stages of their life cycle. Table 2 below reviews the availability of indicators in the EU-SILC 2009, separately for each age group, that correspond with the dimensions of child well-being arising from the CRC.

No specific data are collected in the EU-SILC 2009 for any of the age groups for the dimensions related to child exploitation, cruelty and violence, birth registration, or civil rights. No information about the health of children under 17 is available. Of the remaining dimensions, environmental pollution is excluded from EU-MODA because the relevant item in the EU-SILC is subjective in nature, with no clarification in the data collection guidelines as to what constitutes a problematic level of pollution.⁹ Moreover, local environment items in the EU-SILC tend to be influenced by the rural/urban divide (Whelan and Maitre 2012). At the same time, the social security dimension is excluded because, although the EU-SILC records the income components of each household, including child-related benefits, there is no information on eligibility and take-up. Thus, children who have no access to the benefits they are entitled to cannot be identified with certainty. Furthermore, this dimension is less relevant to the study of the EU countries, since most of them have child-related social transfers in place, whether universal or means-tested.

³ The EU-SILC is based on a common legal framework, where all participating countries use the same list of target variables and their definitions, and data collection guidelines (ex-ante output harmonisation). See Wolff (2010) for a detailed description of the EU-SILC legal and methodological frameworks.

⁴ This module is repeated in 2013 (although the child items are optional) and in 2014. See: http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/methodology/list_of_variables. EU-MODA will be updated when the child specific indicators from the next round of indicators become available.

⁵ There is some inconsistency across countries in the upper age limit used for collecting information about children’s items (15-16 years old). For comparability, the analysis for under-17s is limited here to those aged 1-15.

⁶ However, it is unlikely that there is substantial intra-household inequality in living conditions among children in the EU: “there is little evidence of distinct gender bias in resources allocated to boys and girls in industrialized, non-traditional societies” (Lundberg 2005: 343).

⁷ Information on the compulsory age of starting school in European countries in 2009 is obtained from Eurostat: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/ilc_ca_esms.htm. The compulsory school starting age was: seven in Bulgaria, Finland, Estonia, Lithuania, and Sweden; six in Austria, Belgium, Czech Republic, Denmark, France, Germany, Iceland, Ireland, Italy, Norway, Poland, Portugal, Romania, Slovenia, Slovak Republic and Spain; five in Cyprus, Greece, Hungary, Latvia, Malta, the Netherlands, and the United Kingdom; four in Luxembourg.

⁸ For consistency with Eurostat’s at-risk-of-poverty estimation methodology, age at the end of the reference period (rather than age at interview, or, alternatively, survey year minus year of birth) is used to define age groups.

⁹ “Do you have any of the following problems related to the place where you live? Pollution, grime or other environmental problems in the local area, such as: smoke, dust, unpleasant smells or polluted water? (HS180)” The guidelines to the item HS180 state: “The objective is to assess whether the respondent feels ‘pollution, grime,...’ to be a problem for the household (not on the fact to be bothered by the problem). No common standards of what is a problem are defined” (EU Commission 2009).

Table 2 Availability of Information on Child Well-being Dimensions in the EU-SILC 2009

Dimensions	Preschool age children	School-age children	Children aged 17-18
Nutrition	√	√	x
Water and sanitation	√	√	√
Health care	x	x	√
Shelter, housing, clothing	√	√	√
Environment, pollution	√	√	√
Education	√	√	√
Leisure	√	√	√
Cultural activities	√	√	√
Information	√	√	√
Exploitation, child labour	x	x	x
Other forms of exploitation	x	x	x
Cruelty, violence	x	x	x
Violence at school	x	x	x
Social security	√	√	√
Birth registration; Nationality	x	x	x
Information	√	√	√
Freedom of expression, views, opinions; Being heard; Freedom of association	x	x	x

√ - information available; x – information not available.

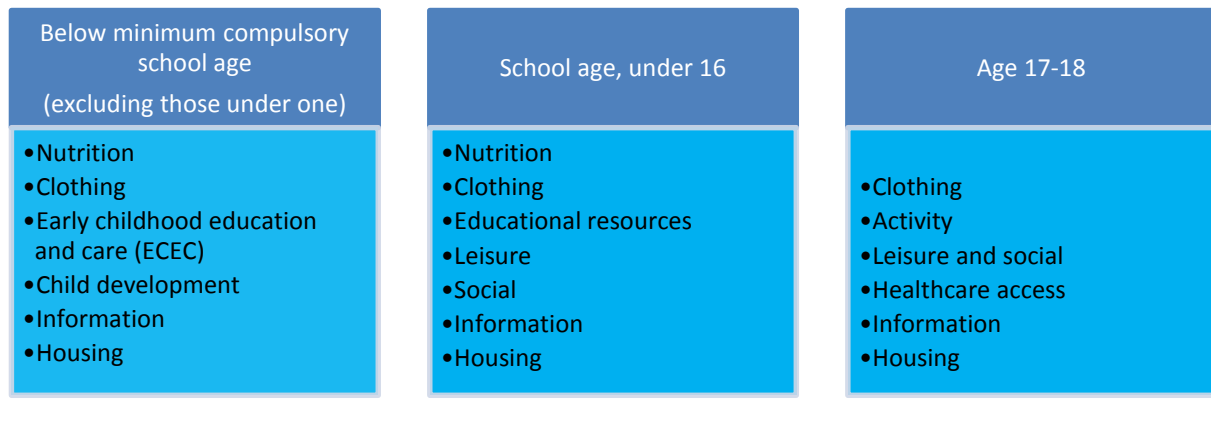
Figure 1 below lists the dimensions selected for EU-MODA. Data on clothing, information and housing dimensions are available for all three age groups. Leisure and social activities, however, are measured only for school age children and adolescents, while child development is used as a comparable dimension for preschool children. Because education needs tend to be age specific, the education dimension is embedded in the Early Childhood Education and Care (ECEC) systems for preschool children,¹⁰ educational resources for school-age children,¹¹ and economic activity for the 17-18-year-olds. Access to health care, although relevant for all children, is only used for adolescents aged 17-18 for data availability reasons.¹² Conversely, the nutrition dimension, although relevant to all children, is only included for the two younger age groups due to the lack of relevant data for the oldest age group.

¹⁰ It is restricted to children between the age of three and the compulsory school age because 0-2-year-olds may be too young to fully benefit from the educational component of the ECEC systems. ECEC programmes “are normally designed for children from age 3 and include organised learning activities”. (UNESCO 2007)

¹¹ There is no information about school attendance or school achievement in the EU-SILC. Although there is information about compulsory school enrolment for children up to the age of 12, nearly all attend compulsory school for at least one hour a week.

¹² For the oldest age group, the education dimension is labelled as activity because the end of compulsory schooling varies across the EU, so 17-18-year-olds may be in education, training, work or “not in education, employment or training” (NEET).

Figure 1 Life cycle stages and dimensions used for EU-MODA analysis



EU-MODA follows the guidelines for the selection of indicators and thresholds to operationalize the dimensions of child well-being established in de Neubourg et al (2012a). The MODA approach requires the indicators constituting each dimension to be:

- relevant to the corresponding dimension;
- rooted in a relevant policy domain;
- subject to variance across children (i.e. not everyone is deprived or non-deprived in an indicator);
- available for all children in a specific age group;
- free from measurement bias;
- scalable;
- parsimonious and internally consistent.

The number of indicators per dimension in EU-MODA ranges from one to three, with most dimensions being based on two indicators. The MODA guidelines (de Neubourg et al 2012a) advise using the same number of indicators per dimension, if possible.

Material deprivation questions in the EU-SILC database that ask if a particular resource is available to the household have three potential responses: yes; no – because the household cannot afford it; no – for some other reason. Most, if not all, analyses of material deprivation using the EU-SILC define the household (or an adult/child) as deprived only if the item is lacking because it cannot be afforded. This is also how the official EU material deprivation indicators are constructed (see Guio 2009). However, focusing on the enforced lack of resources implicitly introduces a financial dimension to the analysis of deprivation, while the MODA approach aims to keep the monetary and non-monetary dimensions separate. Moreover, parents may under-report the extent of deprivation of their children in order to comply with societal norms, and the full extent of the resulting bias is difficult to establish with certainty (Gabos et al 2011). Finally, the CRC protects children’s rights irrespective of their parents’ or guardians’ “race, colour, sex, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status” (CRC Article 2). Since children tend to not have resources of their own, they should not be excluded from the consumption of goods and services important to their well-being because of the preferences of their parents. Therefore, EU-MODA considers a child who has no access to a

particular item because the household cannot afford it or for any other reason as deprived in the corresponding indicator.

The **nutrition** dimension for the two youngest age groups is based on two indicators: “fresh fruit/vegetables once a day” and “one meal with meat, chicken, fish (or a vegetarian equivalent) at least once a day”. Although the EU-SILC 2009 also asks if any child in the household does not have three meals a day, this indicator is excluded from the nutrition dimension because there is very little variation in it – all or nearly all children tend to have three meals a day. The **clothing** dimension, available for all three age groups, also consists of two indicators: “some new (not second hand) clothes” and “two pairs of properly fitting shoes”.

The **ECEC** dimension for preschool age children and the **activity** dimension for 17-18-year-olds use one indicator each. Children between the age of three and the minimum compulsory school age¹³ are considered deprived in the **ECEC** indicator, and, therefore, in the **ECEC** dimension, if they do not spend at least one hour a week in formal child care (preschool, compulsory school, centre-based services, or a day-care centre). One hour a week may be a low threshold, but it successfully identifies children who are not enrolled in any formal ECEC facilities at all. Fewer than half of all EU member states have achieved the official EU target to provide formal childcare services to 90% of children between the age of three and mandatory school age by 2010, with substantial cross-country variation in the proportion of children attending formal childcare facilities for at least one hour a week (European Commission 2013). Children one or two years of age are excluded from the estimation of the ECEC indicator deprivation headcount rate, but are considered non-deprived in calculation of the dimension deprivation rate. A 17-18-year-old is considered deprived in **activity**, both the indicator and the dimension, if he/she is currently not in education, employment or training (NEET). For school-age children, **educational resources** comprise two indicators: “school trips” and “a suitable place at home to study”. A child is deprived in the “school trips” indicator if there is at least one school-age child under 16 in the household who does not participate in school trips and/or school events that cost money.¹⁴ The second indicator refers to there being at least one school age child under 16 who does not have a suitable place at home to study or do homework.

The **child development** dimension for preschool-age children is based on three indicators: the availability of books at home suitable for their age (“books at home”); the availability of indoor games or outdoor leisure equipment (“games”); and opportunities to celebrate special occasions and have friends around to play from time to time (“social activities”). For school-age children, this domain is broken up into two distinct dimensions to separate its recreational element from the social development one. **Leisure** is based on the “books at home” and “games” indicators, while **social** refers to having celebrations on special occasions and having friends around to play, as two separate indicators (see Annex 1 for a detailed description of indicators and dimensions for each age group). Although it would also have been preferable to keep **leisure** and **social** as separate dimensions for 17-18-year-olds, there is only one item in the EU-SILC relevant to each of these domains, so they are combined in one dimension. For this age group, **leisure and social** is based on

¹³ Eurostat uses age at survey year to calculate formal childcare arrangements statistics, rather than the age at the end of the income reference period. This explains the discrepancies between the deprivation rates on the ECEC indicator and the official childcare use statistics published by Eurostat

¹⁴ It is not clear from the EU-SILC variables descriptions whether this survey question is meant to refer to a particular period (e.g. the past year) or to hold generally.

two indicators: getting together with family or friends for a meal or a drink at least once a month and participating in a regular leisure activity.

Healthcare access is a dimension that is only available for 17-18-year-olds because they are interviewed as part of the adult module. It uses two indicators: unmet medical needs and unmet dental needs. A young person is deprived in the unmet medical (dental) need indicator if on at least one occasion in the last 12 months he/she needed medical (dental) examination or treatment but did not receive it. Comparable items are available in the EU-SILC deprivation module for children under 16, but they are optional, i.e. member states do not have to collect these statistics. As only 18 countries out of the 29 included in the survey collect this information for children, the healthcare access dimension is not included for children under 16.

Information is available for all three age groups. For children under 16, it is based on two household-level indicators: a computer and an internet connection (accessed by any means, including via a phone or a television). Availability of a TV in the household was considered as an alternative indicator, but was excluded because public information can be obtained via the internet. For 17-18-year-olds, whether they have a mobile phone is used as the third indicator of the **information** dimension because of the high prevalence of mobile phone use among young people in the EU.¹⁵ In a Special Eurobarometer survey on the perceptions of poverty and social exclusion carried out in 2007, young people aged 15-24 were the most likely of all cohorts to name having a mobile phone an absolute necessity (TNS Opinion & Social 2007).

Finally, the **housing** dimension is used for all three age groups. It comprises three indicators: overcrowding, water and sanitation, and multiple housing problems. All three are measured on the household level, so this dimension is constructed identically for all age groups. Overcrowding is measured using the Eurostat definition. A dwelling is overcrowded if the household does not have at its disposal:

- one room for the household;
- one room per couple in the household;
- one room for each single person aged 18 or more;
- one room per pair of single people of the same gender between 12 and 17 years of age;
- one room for each single person between 12 and 17 years of age and not included in the previous category;
- one room per pair of children under 12 years of age.¹⁶

A child is deprived in the “water and sanitation” indicator if their dwelling lacks at least one of the following: a bath/shower for sole use of the household; an indoor flushing toilet for sole use of the household; or hot running water. Finally, the “multiple housing problems” indicator is defined as living in a dwelling that suffers from at least one of the following: a leaking roof, damp roof/walls/foundation, rot in window frames or floor; there is not enough day light coming through the windows. The “water and sanitation” and “multiple housing problems” indicators each comprise several survey items because these items fit together conceptually and the deprivation rates based on each item in isolation would be very low.

¹⁵ In 2008, the percentage of 16-24-year-olds using mobile phones ranged from 88% in Romania to 100% in Iceland (EUROSTAT Table “Use of mobile phone” (soc_cias_mph) accessed on June 11, 2013).

¹⁶ This definition implies that a child under 12 should not share a room with a 12-17-year-old, even if they are of the same gender.

See Annex 1 for a full description of the indicators and thresholds used to construct the dimensions for each age group in the study.

EU-MODA AND CHILD DEPRIVATION IN THE EU

The EU recognizes the multidimensional nature of poverty: the social exclusion target of the 'Europe 2020' Strategy, adopted by the European Council in 2010, is monitored using an indicator comprising three sub-indicators: at-risk-of-poverty rate; severe material deprivation; and living in a very low work intensity household.

The official EU indicator of material deprivation, adopted by the EU Social Protection Committee (see Guio 2009), refers to the household's reported inability to afford at least three out of nine items: to face unexpected expenses; to afford a one week annual holiday away from home; to pay for arrears (mortgage or rent, utility bills or hire purchase instalments); to have a meal with meat, chicken or fish every second day; to keep the home adequately warm; to have a washing machine; to have a colour TV; to have a telephone; to have a personal car. Severe material deprivation is defined as lacking four out of the above nine items. Information on these items is collected in every annual round of the EU-SILC, which allows monitoring the level of household material deprivation in the EU.

To date there is no official EU indicator of child material deprivation, although one is being developed. The European Commission Recommendation "Investing in Children: Breaking the Cycle of Disadvantage" adopted on 20 February 2013, lists child deprivation as one of the items in its monitoring framework, but specifies that its definition is "under discussion". Using the child-centred deprivation items collected in the EU-SILC 2009, de Neubourg et al (2012c) constructed a 14-item European child deprivation index,¹⁷ thirteen of which are child specific while one is measured on the household level (access to the internet). The deprivation threshold was drawn at lacking two or more items. In contrast, Guio et al (2012) proposed an 18-item child deprivation index that mixes child-centred items with household items from the EU-SILC 2009. They presented the results using a variety of thresholds and showed that drawing the threshold at lacking three items or more would lead to a child deprivation rate similar to one produced using the standard EU indicator (i.e. proportion of children living in households lacking at least three out of nine items).

While EU-MODA uses the same underlying micro data and many of the same child- and household-level variables as the above studies, it does not construct a multi-item child deprivation index, but rather a set of dimensions each based on one to three items. This helps draw attention to the sectors of child well-being that children are the most likely to be deprived of and inform policies designed to tackle these disadvantages. Unlike the 'dashboard' approach which, by focusing on deprivation rates in each separate indicator (e.g. UN 2013), may result in a proliferation of indicators, or the composite index approach (e.g. de Neubourg et al 2012c; Guio et al. 2012), which can be regarded as one-dimensional (Bourguignon and Chakravarty 2003), EU-MODA maintains its multidimensionality without "getting lost in dimensions" (see de Neubourg et al 2014). Furthermore, EU-MODA contributes to the literature in childhood poverty in the EU by analysing the degree of overlap across several deprivation dimensions, between each dimension and monetary poverty, and between multidimensional deprivation and monetary poverty.

¹⁷ This indicator was then used in constructing a league table of child poverty in rich countries in the *Innocenti Report Card 10* (UNICEF 2012) and a comparison of child well-being in rich countries in the *Innocenti Report Card 11* (UNICEF 2013).

CONSTRUCTION OF DIMENSIONS

EU-MODA uses the union approach to aggregating indicators into dimensions, whenever this is more than one indicator to form a dimension. Being deprived in one of the indicators is a sufficient condition for counting as being deprived in the corresponding dimension. This implies that the indicators complement rather than substitute each other. Thus, the absence of deprivation in one indicator does not make up for the deprivation in another. For instance, if a child lives in overcrowded accommodation, he/she is counted as deprived in the housing dimension even if the dwelling does not suffer from multiple housing problems or water and sanitation deficiencies.

It has to be noted that the indicators forming a dimension on their own (e.g. ECEC for preschool children) implicitly have a greater influence on that dimension than the indicators that are grouped together into a single dimension (e.g. overcrowding, water and sanitation,¹⁸ and multiple housing problems for the housing dimension). This may result in higher dimension deprivation headcount rates for the dimensions that comprise three indicators rather than one or two. However, it is important to keep the indicators that fit together conceptually as a part of the same dimension because if studied as separate dimensions in their own right, certain domains of child well-being would be given disproportionate significance in the analysis (e.g. there would be two or three housing-related dimensions rather than one).

There is considerable variation in the degree of scalability¹⁹ of indicators within dimensions across different dimensions, age groups and countries. Overall, the information dimension consistently shows the highest degree of scalability for all the age groups, while housing shows the lowest levels of scalability. All dimensions tend to form highly reliable scales in Romania, Bulgaria, the three Baltic countries, as well as Hungary and the Slovak Republic. There is some evidence for the degree of within-dimension scalability being positively associated with the overall level of child deprivation in the country: indicators tend to scale better in countries with higher child deprivation levels. However, the indicators in each dimension do not necessarily need to exhibit high levels of scalability because they are not being averaged across to create a scale or an index – rather, a child is considered deprived if he/she is deprived in at least one of the dimension's indicators (i.e. the union approach). Furthermore, EU-MODA examines the deprivation rates within separate indicators before proceeding to the multidimensional analysis.

MISSING VALUES

Since EU-MODA aims to capture the situation of each child, the lack of data in some key dimensions of child well-being, as well as missing values for certain groups of children in particular countries in the EU-SILC 2009, present key challenges to the selection of dimensions, indicators, and thresholds. For consistency across indicators, dimensions, age groups and countries, list-wise deletion is used here: children with missing data on at least one indicator are excluded from the study. Thus, all of the analyses in EU-MODA are based on the same sample of children, but our estimates may not be fully comparable to the official EU-SILC-based indicators published by Eurostat. Child-specific deprivation items in the EU-SILC user database may have missing values for two main reasons: item non-response and non-applicability of the survey question because there

¹⁸ “Water and sanitation” could be operationalized as a separate dimension, as it is in the CC-MODA project for lower and middle income countries (de Neubourg et al 2012b), but it would result in very low deprivation incidence in this dimension in EU-MODA.

¹⁹ Measured using Cronbach's Alpha.

are no children aged 1-15 in the household. Proportions of missing values due to item non-response tend to be relatively low (except in Sweden²⁰). The second source includes children whose households were erroneously identified as having no children in the relevant age category, which appears to be most likely to affect children under three with no older siblings in the household. Guio et al (2012, p.17) dropped children aged one or two erroneously labelled as 'non-applicable' from their calculations. EU-MODA treats both sources of missing data as missing, although the second type (i.e. non-applicable) dominates. It is crucial that in the next round of collection of child-specific indicators, the prevalence of either type of error is minimised.

A number of country samples suffer from high proportions of "non-applicable" missing values on one or two child deprivation variables, but have valid data for all the others. In order to minimise the proportion of children excluded from the analysis because of one or two survey items, the corresponding dimensions were reconstructed to exclude these variables. This approach reduces the cross-country comparability of the results but allows for a consistent analysis within countries. For example, missing values for pre-school-age children in Bulgaria were largely due to erroneously labelling large proportions of households with children as household without any children under 16 for the four items constituting the "games" and "social activities" indicators of the child development dimension for the youngest age group.²¹ Therefore, this dimension had to be modified to include the "books at home" indicator only. Similarly, the "homework" indicator was removed from the construction of the educational resources dimension for Ireland. Unfortunately, the entire educational resources dimension had to be removed from the analysis for school-age children in Denmark, Hungary, Latvia, Malta, and Slovakia. As regards the oldest age group, the following countries were entirely omitted from the analysis because information on many items was not collected at all: Belgium, Czech Republic, Denmark, Finland, Iceland, the Netherlands, Norway, Sweden, Slovenia and the UK. The proportion of missing data for 17–18-year-olds is below 10 per cent in each of the remaining countries.

Table A2 in the Annex shows the proportions of children excluded from the analysis due to missing values, separately for each age group and country.

Missing values are particularly a problem when they are not missing at random. Total disposable household income data largely do not suffer from missing values, so income poverty indicators can be used to check whether poor children are systematically more or less likely to be excluded from the analysis. For the youngest age group, in countries where more than 5% of children have been excluded, only in Sweden are there significant differences by income: poor children are more likely to have missing data. As this would result in the under-estimation of child poverty and deprivation rates, data for Sweden need to be interpreted with extreme caution. At the same time, in countries where 10-20% of pre-school age children were excluded (Denmark, Hungary, Italy, Latvia, Malta, and Slovakia), there were no significant differences by income.

Among the countries with more than 5 per cent of excluded data in the school-age group, income-poor children are more likely to be excluded from the analysis due to missing values to have missing values in Austria, Bulgaria, and Sweden Finland and Norway than non-poor children, while

²⁰ In Sweden, one-quarter of the 2009 module was not collected (Guio et al. 2012, p.121).

²¹ Removing all pre-school-age children with missing values on these variables from the analysis would have introduced a large degree of bias: 71% of non-poor preschool-age children in Bulgaria would have been excluded from the study, compared with 57% of poor children. This would lead to over-estimating poverty and deprivation rates.

in Poland, Romania and Slovenia, poor children are less likely to have missing data. However, missing values for Austria and Bulgaria are relatively low (7 per cent), while data for Sweden (35 per cent) need to be interpreted with extreme caution. There are no significant differences by income for the oldest age group, except in Slovakia, where poor children were more likely to be excluded.

PROFILING VARIABLES

In addition to estimating the headcount rates of child poverty and deprivation, EU-MODA investigates whether children with different household characteristics are more or less likely to be poor and/or deprived. This helps construct the profiles of multiply deprived and/or poor children, identifying the most vulnerable sub-groups. Wherever possible, the results of statistical significance tests are reported.²²

The choice of background characteristics (“profiling variables”) is motivated by the existing research and literature, as well as data availability. The following groups tend to be at a higher risk of poverty and/or deprivation in the EU: workless households, large families (with three children or more), lone parent families, households with lower educated adults (see Fusco et al 2010). Furthermore, there may be substantial differences between migrant and non-migrant households and between rural and urban households. Thus, the following profiling variables are used in EU-MODA (all of which are measured at the household level):

- education of the child’s main carer (usually the mother): upper secondary or lower vs. tertiary;
- migrant status of the household: no migrants (i.e. individuals born in countries other than the country of the interview) in the household vs. one or more migrants in the household;
- number of children under 16 in the household: one or two vs. three or more;
- housing tenure: owned accommodation vs. rented accommodation (or other);
- number of parents in the household: two vs. one or none;
- work intensity²³ of adults in the household: less than half of the potential time worked vs. at least half of the potential time worked;
- degree of urbanisation: densely populated or intermediate area vs. thinly populated (i.e. rural) area;
- gender (for 17-18-year-olds only).

Since 17-18-year-olds are interviewed personally, the analysis for the oldest age group is profiled by sex, in addition to the household-level variables above.

EU-MODA DASHBOARD

MODA is more than an analytical tool – it is a system of presenting the results of the multidimensional child deprivation analysis in a user-friendly way. The UNICEF Office of Research presents the MODA results on an interactive web-portal (the “Dashboard”).²⁴ The underlying statistics are visualised in charts and tables. Users are free to select particular subsets of the results

²² When testing for statistical significance, sample design variables are used. Primary sampling units and primary strata are re-created in the EU-SILC user database file according to Goedemé (2013).

²³ The Eurostat work intensity measure is the share of the number of months spent in employment during the year by household members of working age (i.e. those aged 16–64) out of the total number of months they could potentially spend in work, if they were all employed. A work intensity index value of 0 corresponds to no one being in employment – i.e. a jobless household.

²⁴ The EU-MODA Dashboard is currently in development, due to be released by UNICEF Office of Research in 2014.

to be displayed: they can focus on particular dimensions and combinations of dimensions, and select the multidimensional deprivation cut-off points, monetary poverty thresholds, and profiling variables.

EU-MODA Dashboard shows the results from four main types of analysis for each country at a time: single deprivation analysis, multiple deprivation analysis, monetary poverty analysis, and multiple deprivation and monetary poverty overlap analysis. This helps users zoom in on the results they are most interested in.

EU-MODA: SINGLE DEPRIVATION ANALYSIS

In single deprivation analysis, children's well-being is evaluated using one dimension or indicator of deprivation at a time. This helps identify particular problem areas for child well-being as well as those that are performing relatively well.

Let n denote the number of children in a particular age group and q_j represent the number of children in this age group who are deprived in the j th dimension ($j=1, 2, \dots, d$, where d is the total number of dimensions in the analysis). Then the headcount ratio H_j is defined as:

$$H_j = \frac{q_j}{n}$$

Thus, the headcount ratio is the deprivation rate, or deprivation incidence, in a particular dimension (or indicator). It is the number of children deprived in a dimension (or indicator), as a percentage of all children in their age group; when presented separately by household characteristics, it is the deprivation incidence within a sub-group of children with particular household characteristics.

EU-MODA: MULTIPLE DEPRIVATION ANALYSIS

Multiple deprivation analysis examines the number and type of deprivations children experience simultaneously. It shows: (1) the distribution of the number of dimensions children are deprived in; (2) the degree of overlap between various dimensions; (3) the multidimensional deprivation ratios; (4) the profile of the multiply deprived and the most vulnerable; and (5) the contribution of various household characteristics and dimensions to the adjusted deprivation headcount ratio. The results help identify the most vulnerable children, highlighting the multidimensional nature of child deprivation.

Number of deprivations for each child

Each child is deprived in up to six or seven dimensions, depending on their age group: $d=6$ for preschool age children and 17-18-year-olds; $d=7$ for school-age children. To estimate the distribution of deprivations across all children in a particular age group, it is first necessary to calculate the number of deprivations a child i is deprived in ($i= 1, 2, \dots, n$):

$$D_i = \sum_{j=1}^d D_{i,j}$$

Where $D_{i,j}=1$ if the child i is deprived in dimension j and $D_{i,j}=0$ if the child i is not deprived in dimension j .

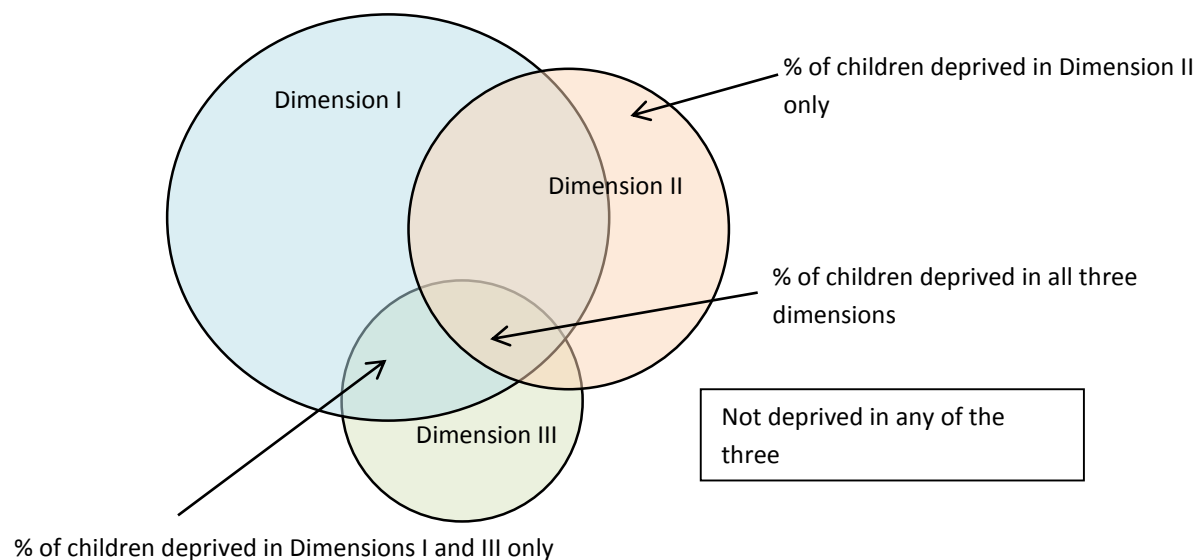
The total number of deprivations for a given child (D_i) shows the breadth of deprivation for this child. The distribution of the number of deprivations among children in a given age group at the national level indicates the intensity of the overall child deprivation for this age group. Presenting the distribution of the number of deprivations by various household characteristics helps identify particularly vulnerable children.

Deprivation overlap analysis

The deprivation overlap analysis elicits the combinations of deprivations children experience simultaneously. Understanding which deprivations children are more likely to experience simultaneously sheds light on the nature and depth of multidimensional child deprivation. It helps inform policies that aim to address children’s needs more adequately.

To visualise the overlaps between dimensions, all possible combinations of three dimensions at a time are presented in a Venn diagram (see Figure 2). Six dimensions produce 20 different combinations, while seven dimensions result in 35 such combinations. Each circle in the diagram represents a dimension, with its size proportional to headcount rate in this dimension.

Figure 2 Deprivation overlap of three dimensions



Identifying multiply deprived children

The number of deprivations for each child ranges from zero to six or seven, depending on the age group. A cut-off ($K=1, \dots, d$) needs to be selected to identify multiply deprived children. A child i is multiply deprived if the number of his/her deprivations is greater or equal to the cut-off:²⁵

$$i_k = 1 \text{ if } D_i \geq K$$

$$i_k = 0 \text{ if } D_i < K$$

²⁵ Note that the union approach uses $K=1$, while the intersection approach uses $K=d$.

Multidimensional child deprivation is analysed using all possible cut-offs: the EU-MODA Dashboard allows any cut-off point to be selected. Comparing the results using different cut-offs can give valuable insights into the breadth of child deprivation.

Unlike in the single deprivation analysis, a different deprivation headcount ratio is associated with every cut-off point K . The multidimensional headcount ratio is defined as follows:

$$H_k = \frac{q_k}{n}$$

where $q_k = \sum_{i=1}^n i_k$

Thus, H_k refers to the number of children in a given age group who are multiply deprived according to a particular cut-off point K , as a percentage of all children in this age group.

Although a good indicator of the multiple deprivation incidence, the headcount ratio (H_k) is not sensitive to the breadth of multidimensional deprivation. For instance, the proportion of children deprived in three or more dimensions remains the same even if all children already deprived in three dimensions become deprived in an additional dimension.

MODA uses the Alkire and Foster (2011) methodology to adjust the multidimensional headcount ratio by the breadth of deprivation. The average deprivation intensity among the deprived, expressed as a percentage, is defined as follows:

$$A = \frac{\sum c_{i,k}}{q_k * d}$$

where $c_{i,k}$ is the number of dimensions a multiply deprived child is deprived in according to the chosen cut-off K ; q_k is the total number of children deprived according to this cut-off, and d is the total number of dimensions in the analysis.

Average deprivation intensity (A) can also be calculated as the number of deprivations that a deprived child suffers from divided by the maximum number of dimensions studied, averaged out across all the deprived children in the relevant age group. It captures the share of all possible deprivations an average deprived child suffers from.²⁶ If multiplied by the total number of dimensions analysed, it is the average number of deprivations across the deprived, expressed as a number. For example, if $A=50\%$ and $d=6$, the average number of deprivations across the deprived is three.

The adjusted headcount ratio (M_o) is then calculated as:

$$M_o = H * A$$

Alkire and Foster (2011) demonstrate a number of useful properties that the adjusted headcount ratio satisfies. One of these is “dimensional monotonicity”, which implies that the deprivation rate should fall when a deprived child experiences an improvement in one of the dimensions. Thus, unlike the raw headcount ratio, the adjusted measure is sensitive to the breadth of deprivation experienced by each child. A product of two proportions, M_o is a number ranging between 0 and 1.

²⁶ Note that this is a censored measure: it is calculated only for the children who are deprived based on the chosen cut-off. EU-MODA Dashboard does not report the average intensity of deprivation where the number of deprived children is below 30.

EU-MODA Dashboard displays the headcount ratio (H), the adjusted headcount ratio (M_0) and the average intensity of deprivation (A), expressed both as a percentage and as a number, for each possible cut-off. However, M_0 and A are not reported if they are based on a very small sub-sample of deprived children (30 children or fewer).

PROFILING THE MULTIPLY DEPRIVED CHILDREN

Both the deprivation headcount ratio (H) and the adjusted headcount ratio (M_0) can be compared across sub-groups of children with different household characteristics. For the headcount ratio, the odds of being deprived can be compared for children with different characteristics, with statistically significant differences highlighted. The adjusted headcount ratio can be decomposed into the shares contributed by various sub-groups of children as well as into shares contributed by different dimensions.

Decomposing the adjusted headcount ratio by sub-group

The overall adjusted headcount ratio is the weighted average of sub-group deprivation measures, where the weights are the shares of these sub-groups in the population. For instance, if there are two groups of children, n_1 and n_2 :

$$M_0 = M_{01} * \frac{n_1}{n} + M_{02} * \frac{n_2}{n}$$

EU-MODA Dashboard shows the per cent contribution of different household characteristics of children to the national adjusted deprivation headcount (M_0) for a given age group. The higher the incidence and severity of deprivation among children in a particular sub-group and the higher the prevalence of this household characteristic in the population of children, the more this household characteristic will contribute to the overall adjusted deprivation headcount (M_0). A downside of this weighted average approach is that the characteristics of highly deprived children who happen to be a very small sub-group in the population will appear to contribute relatively little to the national adjusted headcount ratio.

Decomposing the adjusted headcount ratio by dimension

The adjusted deprivation headcount ratio can also be decomposed to show how much each dimension contributes to the overall adjusted headcount or the adjusted headcount by sub-group. This helps identify particular dimensions that may drive the overall adjusted deprivation headcount rate given a particular cut-off. For instance, with the cut-off of one out of six, if a high proportion of children are deprived in housing, but very few are deprived in other dimensions, the housing deprivation rate will contribute disproportionately to the overall deprivation rate. The relative contribution of the j th dimension to the overall adjusted headcount rate is calculated as:

$$P_j = \frac{\sum D_{i,j} * i_k}{n * d * M_0}$$

where $\sum D_{i,j} * i_k$ is the total number of children deprived in the j th dimension who are also multiply deprived according to the cut-off K .

EU-MODA: MONETARY POVERTY ANALYSIS

The monetary poverty analysis presents the at-risk-of-poverty rates of children with different household characteristics, using two relative poverty thresholds. The child at-risk-of-poverty rate is defined as the proportion of children living in poor households, i.e. those with total equivalent²⁷ disposable income below the selected poverty line. The two main poverty lines are calculated as 60% of the national median disposable equivalent household income. One uses contemporary income measured in 2009 (income reference year 2008), while the other is based on income measured in 2005 (income reference year 2004) and is then updated with inflation for all the intervening years. The contemporary poverty line is sensitive to sudden shifts in the income distribution: median household income may fall during an economic downturn, reducing the poverty line and resulting in an artificially lower child poverty rate even if the number of poor children remains the same. “Anchoring” the poverty line in 2005 (in real terms) helps circumvent this limitation by keeping the threshold fixed at a moment in time rather than allowing it to move with the current income distribution. Additional poverty lines are used in selected analyses: 40% and 50% of the national median income.

EU-MODA: MULTIPLE DEPRIVATION AND MONETARY POVERTY OVERLAP

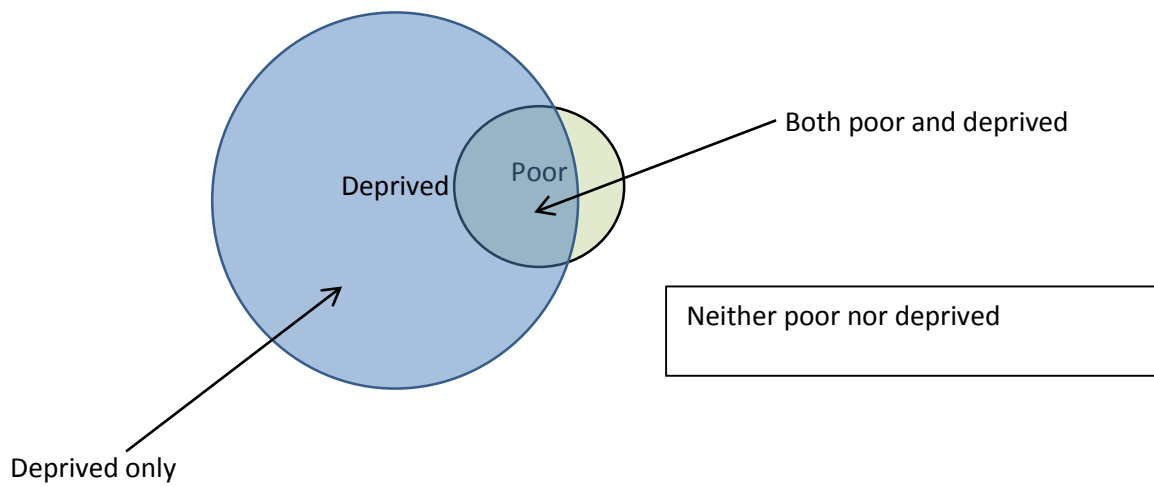
The final section of the EU-MODA Dashboard analyses the extent to which monetary poverty and multidimensional deprivation overlap among children in a particular age group. It investigates the dimensions and the combinations of dimensions that poor and non-poor children are more likely to suffer from. It identifies the profile and composition of children who are at risk of both poverty and deprivation, in comparison with the profile and composition of children who are: deprived but not poor, poor but not deprived, or neither poor nor deprived.

It shows the proportion of poor and non-poor children, for each poverty threshold, who are deprived in each dimension. This helps draw attention to the areas in which the differences between poor and non-poor children are starkest. As a flipside of this analysis, the at-risk-of-poverty rates are presented separately for children deprived in different dimensions. It highlights the dimensions that are most related to the lack of sufficient monetary resources. The distributions of the number of deprivations per child are then compared across poor and non-poor children.

Similarly to deprivation overlap analysis, Venn diagrams are used here to demonstrate the degree of overlap between monetary poverty and multidimensional deprivation, given a particular poverty threshold and a multiple deprivation cut-off (Figure 3). The diagram shows: the proportion of children who are deprived but not poor; poor but not deprived; both poor and deprived; and neither poor nor deprived. It illustrates the extent to which the deprivation rate dominates the poverty rate or vice versa. Figure 3 illustrates a scenario where most poor children are multiply deprived, using a particular deprivation cut-off and a monetary poverty threshold, but the vast majority of the deprived children are not poor, with very few children being poor but not deprived.

²⁷ To take account of the household's size and composition, the modified OECD equivalence is used. It assigns 1 to the first adult in the household, 0.5 to every subsequent adult, and 0.3 to every child under 14 years of age.

Figure 3 Monetary poverty and multidimensional deprivation overlap



Finally, the degree of overlap between monetary poverty and multidimensional deprivation is presented by household characteristics. For each sub-group of children given their household characteristics, EU-MODA shows the proportion who are: poor and deprived; deprived only; poor only; neither poor nor deprived, for each combination of the poverty threshold and deprivation cut-off. Statistically significant differences between the subgroups are reported. Lastly, this section presents the composition of children in each of the four groups (poor and deprived; deprived only; poor only; neither poor nor deprived) by household characteristics.

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ANNEX 1

Table A1 Standard definition of indicators

Age group	Dimension	Indicator name	Indicator definition
1 year or over, below the national minimum compulsory school age	Nutrition	Fruit/vegetables once a day	At least one child aged 1-15 in the household does not have fresh fruit and vegetables once a day because the household cannot afford it or for some other reason.
		One meal with meat once a day	At least one child aged 1-15 in the household does not have one meal with meat, chicken or fish (or vegetarian equivalent) at least once a day because the household cannot afford it or for some other reason.
	Clothing	Some new clothes	At least one child aged 1-15 in the household does not have some new (not second hand) clothes because the household cannot afford it or for some other reason.
		Two pairs of shoes	At least one child aged 1-15 in the household does not have two pairs of properly fitting shoes (including a pair of all-weather shoes) because the household cannot afford it or for some other reason.
	Early childhood education and care (ECEC)	Early childhood education and care (ECEC)	The child does not spend at least one hour a week in formal child care (preschool, compulsory school, centre-based services, or day-care centre)
	Child development	Books at home	At least one child aged 1-15 in the household does not have books at home suitable for their age because the household cannot afford it or for some other reason.
		Games (outdoor, indoor)	At least one child aged 1-15 in the household does not have outdoor leisure equipment (bicycle, roller skates, etc.) or indoor games (educational baby toys, building blocks, board games, computer games, etc.) because the household cannot afford it or for some other reason.
		Social activities	At least one child aged 1-15 in the household does not have celebrations on special occasions (birthdays, name days, religious events, etc.) or does not invite friends round to play and eat from time to time because the household cannot afford it or for some other reason.
	Information	Computer	The household does not have a computer because it cannot afford it or for some other reason.
		Internet	The household does not have an internet connection because it cannot afford it or for some other reason.
School-age, under 16	Nutrition	Fruit/vegetables once a day	At least one child aged 1-15 in the household does not have fresh fruit and vegetables once a day because the household cannot afford it or for some other reason.
		One meal with meat once a day	At least one child aged 1-15 in the household does not have one meal with meat, chicken or fish (or vegetarian equivalent) at least once a day because the household cannot afford it or for some other reason.

Clothing	Some new clothes	At least one child aged 1-15 in the household does not have some new (not second hand) clothes because the household cannot afford it or for some other reason.
	Two pairs of shoes	At least one child aged 1-15 in the household does not have two pairs of properly fitting shoes (including a pair of all-weather shoes) because the household cannot afford it or for some other reason.
Educational resources	School trips	At least one child under 16 attending school does not participate in school trips and school events that cost money because the household cannot afford it or for some other reason.
	Suitable place at home to study	At least one child under 16 attending school does not have a suitable place at home to study or do homework.
Leisure	Books at home	At least one child aged 1-15 in the household does not have books at home suitable for their age because the household cannot afford it or for some other reason.
	Games (outdoor, indoor)	At least one child aged 1-15 in the household does not have outdoor leisure equipment (bicycle, roller skates, etc.) or indoor games (educational baby toys, building blocks, board games, computer games, etc.) because the household cannot afford it or for some other reason.
	Regular leisure activity	At least one child aged 1-15 in the household does not have a regular leisure activity (swimming, playing an instrument, youth organisations, etc.) because the household cannot afford it or for some other reason.
Social	Celebrations on special occasions	At least one child aged 1-15 in the household does not have celebrations on special occasions (birthdays, name days, religious events, etc.) because the household cannot afford it or for some other reason.
	Having friends round to play	At least one child aged 1-15 in the household does not invite friends round to play and eat from time to time because the household cannot afford it or for some other reason.
Information	Computer	The household does not have a computer because it cannot afford it or for some other reason.
	Internet	The household does not have an internet connection because it cannot afford it or for some other reason.
Aged 17-18	Clothing	Cannot replace worn-out clothes with some new (not second-hand) ones because he/she cannot afford it or for some other reason
		Does not have two pairs of properly fitting shoes (including a pair of all-weather shoes) because he/she cannot afford it or for some other reason.
Economic activity	NEET	Currently not in education, employment or training, including military or community service.
Leisure and social	Social life	Does not get together with friends/family (relatives) for a drink/meal at least once a month because he/she cannot afford it or for some other reason.
	Regular leisure activity	Does not participate in a regular leisure activity such as sport, cinema, concert because he/she cannot afford it or for some other reason.

Healthcare access	Unmet medical need	There was at least once occasion during the last 12 months when the person really needed medical examination or treatment but did not have it for any reason.
	Unmet dental need	There was at least once occasion during the last 12 months when the person really needed dental examination or treatment but did not have it for any reason.
Information	Mobile phone	Does not have a mobile phone because he/she cannot afford it or for some other reason.
	Computer	The household does not have a computer because it cannot afford it or for some other reason.
	Internet	The household does not have an internet connection because it cannot afford it or for some other reason.
All age groups		The household does not have at its disposal a minimum number of rooms ¹ equal to: one room for the household; one room per couple in the household; one room for each single person aged 18 or more; one room per pair of single people of the same gender between 12 and 17 years of age; one room for each single person between 12 and 17 years of age and not included in the previous category; one room per pair of children under 12 years of age.
Housing	Overcrowding	
	Sanitation	The dwelling lacks at least one of the following: a bath/shower for sole use of the household; an indoor flushing toilet for sole use of the household; hot running water.
	Multiple housing problems	The dwelling suffers from at least one of the following: a leaking roof, damp roof/walls/foundation, rot in window frames or floor; there is not enough day light coming through the windows.

¹ A room is defined as a space of a housing unit of at least 4 square meters such as normal bedrooms, dining rooms, living rooms and habitable cellars and attics with a high over 2 meters and accessible from inside the unit. Kitchens are not counted unless the cooking facilities are in a room used for other purposes; only exclude it if the space is used only for cooking. Thus for example, kitchen-cum-dining room is included as one room in the count of rooms. The following space of a housing unit does not count as rooms: bathrooms, toilets, corridors, utility rooms and lobbies. Verandas, lounges and conservatories do count only if they are used all year round. See EU-SILC Description Target Variables (HH030) at http://epp.eurostat.ec.europa.eu/portal/page/portal/income_social_inclusion_living_conditions/documents/tab/Tab/Household%20data%20-%20housing%20data%2Bchange%20in%20HH071.pdf.

Table A2 *Proportion of missing values by country and age group*

	Preschool age	School age	17-18
AT	0.06	0.07	0.00
BE	0.03	0.04	0.04
BG	0.00	0.07	0.00
CY	0.00	0.00	0.00
CZ	0.00	0.03	
DE	0.01	0.02	0.03
DK	0.10	0.03	
EE	0.00	0.07	0.01
EL	0.00	0.00	0.01
ES	0.06	0.04	0.03
FI	0.09	0.01	
FR	0.00	0.01	0.02
HU	0.20	0.05	0.05
IE	0.07	0.07	0.00
IS	0.08	0.01	
IT	0.13	0.06	0.00
LT	0.04	0.01	0.07
LU	0.03	0.05	0.00
LV	0.14	0.00	0.01
MT	0.20	0.02	0.01
NL	0.01	0.03	
NO	0.00	0.01	
PL	0.00	0.02	0.09
PT	0.00	0.02	0.01
RO	0.01	0.03	0.00
SE	0.34	0.35	
SI	0.00	0.01	
SK	0.13	0.04	0.03
UK	0.05	0.03	

Source: EU-SILC 2009 (version 2009-4 from 01-03-2013). Individual cross-sectional weights used.