

JRC SCIENCE FOR POLICY REPORT

A note on early childhood education and care participation by socio-economic background

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2019



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EU Science Hub

<https://ec.europa.eu/jrc>

JRC117663

EUR 29835 EN

PDF ISBN 978-92-76-09694-8 ISSN 1831-9424 doi:10.2760/315380

Luxembourg: Publications Office of the European Union, 2019

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How to cite this report: Flisi, S., Blasko, Zs: A note on early childhood education and care participation by socio-economic background, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-09694-8, doi:10.2760/315380, JRC117663.

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Abstract

This report investigates alternatives to the current targets related to early childhood education and care (ECEC), in particular by looking at socio-economic differences in the level of ECEC attendance in EU Member States. Using data from the EU Survey on income and living conditions (EU-SILC), it assesses different categorisations of socio-economic disadvantage, based on household income; maternal education; and whether or not the child lives in a household, which is at risk of poverty (AROP) or at risk of poverty or social exclusion (AROPE). Irrespective of which categorisation is used, the report shows considerably lower ECEC attendance rates for children from a lower socio-economic background when compared to those from a higher one. This suggests that the attempt to focus on particular subgroups of children is well justified. Based on a range of methodological and conceptual considerations, AROPE emerges as the most appropriate measure to build a possible ECEC indicator.

Acknowledgements

This note is part of the Learning for Life in the Digital Age (LLDA) Administrative Agreement agreed between DG EDUCATION and CULTURE (EAC) and DG JOINT RESEARCH CENTRE (JRC).

The authors would like to thank Karen Haegemans, Veronica De Nisi (DG EAC) and Federico Biagi (DG JRC) for their useful comments and suggestions to improve earlier versions of this note, as well as Emilio di Meglio (DG ESTAT) for providing supporting information.

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Executive summary

Policy context

Early childhood education and care (ECEC) has been at the heart of EU policies for almost two decades. In 2002, the European Council set the so-called ‘Barcelona targets’, establishing that Member States should remove disincentives to female labour force participation and strive by 2010 to provide childcare to at least 33 % of children below 3 years of age, and to 90 % of children between 3 and the mandatory school age. In 2009, a specific ‘ECEC benchmark’ was adopted under the ET2020 strategic framework ‘with a view to increasing participation in high quality early childhood education as a foundation for later educational success, especially in the case of those from disadvantaged backgrounds’. It foresaw that at least 95% of children between the age of 4 and the age for compulsory primary education should participate in early childhood education and care by 2020. Since the establishment of these targets, the European Commission has been constantly monitoring ECEC attendance in EU Member States.

Following the general improvements in the level of overall ECEC attendance in Europe – with both sets of targets being almost reached by 2016 – suggestions have been made to re-tailor the indicators to better focus policy-makers’ attention on maximising the benefits from early childhood education and care. Research findings suggest that children from low socio-economic backgrounds are likely to benefit the most from ECEC; however, evidence shows that they often have lower access to these services. Moving from this, an option proposed by the Commission to refine early education targets suggests focussing on children from low socio-economic groups.

So far, few attempts have been made to systematically and regularly report on ECEC attendance by socio-economic status of the parents in a comparative manner across EU countries, mostly due to data limitations. This note aims at providing early childhood education and care attendance rates for the EU Member States by socio-economic background, to inform the ongoing debate in the Commission towards the development of future targets in the field of education and training.

Key conclusions

This analysis finds notable gaps in ECEC participation between children from low socio-economic backgrounds and the rest of the children population in several EU Member States. This often means that socio-economically disadvantaged children are still rather far from reaching the Barcelona target. It is therefore possible to conclude that the proposal to re-tailor ECEC attendance targets towards this subgroup is well justified.

From a methodological perspective, the note concludes that despite some limitations, EU-SILC is the best available option for measuring ECEC participation of socially disadvantaged children across Europe. Among the several categorisations used to capture socio-economic background, those based on household income tertiles and the risk of poverty or social exclusion (AROPE) are identified as the main candidates for a potential ECEC indicator. While the former ensures somewhat more reliable estimates, AROPE is a more precisely defined, widely used and better understood indicator of social disadvantage, and therefore might be better suited for policy purposes.

The note also points out that it is not sufficient to report only participation rates of disadvantaged children in Member States. A meaningful interpretation of such rates requires a comparison with either the overall participation rate, or the participation rate of the non-disadvantaged children in the country.

Main findings

The analysis presented in this report reveals a socio-economic gap in childcare attendance in several Member States, implying that in many countries children from socially disadvantaged groups have a lower chance to enjoy the potential benefits of ECEC. The size – and indeed the mere existence – of the gap found not only varies by country, but also depend on what social groups and which age brackets are considered. However, the analysis also aims at drawing attention to the importance of considering the level of statistical significance when comparing indicators across subgroups: even seemingly large differences can be statistically irrelevant, especially when the underlying sample size is limited.

In this overview, the socio-economic background is operationalised in four distinct ways, each dividing the population into more and less advantaged social groups along different dimensions. The purpose of using different categorisations is to investigate which of them captures family background in a way that allows

identifying the target group of disadvantaged children, while at the same time providing reliable results, with a view to building a possible ECEC target or indicator. Categorisations are therefore evaluated based on three different criteria: (i) their ability to identify a group of disadvantaged children with significantly lower participation in ECEC than their more advantaged peers; (ii) the level of reliability of the results, especially in terms of underlying sample sizes; (iii) the ease of understanding of an indicator based on it. Although the socio-economic gap in ECEC participation is apparent in several countries irrespective of the categorisation, there are some clear differences between the various approaches that are worth highlighting.

Smaller and less significant gaps are found when disadvantaged children are identified as children whose mothers did not complete higher education. On the other hand, socio-economic differences are much more apparent when categorisations related to economic and living conditions in the household are used. Remarkable gaps in ECEC attendance are found when comparing children in the lowest household income tertiles to their higher income counterparts, as well as when children in AROP (at risk of poverty) or AROPE households are considered. The identification of disadvantaged group with the lowest income tertile normally ensures reliable sample sizes; on the other hand, such disaggregation is not so widely used for indicators by policy-makers, and possibly rather difficult to interpret and communicate to a wider audience. AROP and AROPE, on the contrary, are well-established living conditions indicators of Eurostat and of the EU2020 Strategy. Consequently, they would be easier to grasp and interpret for a wide audience, which makes them more suitable for a policy-relevant indicator. Between the two indicators, AROPE ensures both more reliable sample sizes, and a wider coverage of situations of disadvantage, therefore qualifying as a superior option.

1 Introduction

Existing research suggests that early childhood education and care (ECEC) can improve children's cognitive outcomes, although its influence varies significantly by quality, type and also the timing of care provided (OECD, 2017; Barnett & Belfield, 2006; Esping-Andersen et al., 2012). Acknowledging these positive outcomes at the individual level as well as a range of broader social benefits ⁽¹⁾ – including promotion of higher female labour market participation – the European Commission has for long been monitoring attendance of ECEC in the EU Member States. In 2002, the European Council set the so-called 'Barcelona targets', establishing that the Member States should remove disincentives to female labour force participation and strive by 2010 to provide childcare to at least 33 % of children below 3 years of age, and to 90 % of children between 3 and the mandatory school age ⁽²⁾. In 2009, a specific 'ECEC benchmark' was adopted under the ET2020 strategic framework, with the recommendation that at least 95 % of children between the age of 4 and the age for compulsory primary education participate in early childhood education and care. This goal was set 'with a view to increasing participation in high-quality early childhood education as a foundation for later educational success, especially in the case of those from disadvantaged backgrounds' ⁽³⁾. Considering the EU average, both sets of targets were almost reached by 2016, albeit with some significant variations across Member States.

Following the general improvements in the level of overall ECEC attendance in Europe, suggestions have been made to re-tailor the indicators to better focus policy-makers' attention on maximising the benefits from early childhood education and care. Among the possible future options elaborated by EAC to refine early education benchmarks, one suggests recalculating them specifically for children from low socio-economic groups. This proposal moves from research findings suggesting that these children (as well as those from families with an immigrant background) are likely to benefit the most from ECEC. In particular, evidence shows that high-quality childcare can compensate for the lack of the richer cultural and educational environment provided to young children in middle-class homes (Elango et al., 2015; Esping-Andersen, 2004; Esping-Andersen et al., 2012). This way an early education and childcare system with high and equal coverage can contribute to equal opportunities as well as to social mobility. It is therefore particularly worrying that socio-economic disadvantage is often coupled with low ECEC attendance, as shown by national studies ⁽⁴⁾ as well as by more recent attempts of OECD to provide evidence on this issue ⁽⁵⁾.

So far, however, little attempts have been made to systematically and regularly report ECEC attendance by socio-economic status of the parents in a comparative manner across EU countries. The main reason is not the lack of relevance of the topic, but data constraints. To have reliable data on the subpopulation of socially disadvantaged children, large-scale standardised international measurement tools with sufficient national sample sizes are needed. Currently, two main data sources allow linking ECEC participation and socio-economic background: the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA), and the EU Survey on income and living conditions (EU-SILC). Still, these two sources need to be used with caution, due to their limitations. For PISA, the long time lag (students at age 15 are reporting about their former childcare attendance) and the consequent reliability issues make the data inappropriate for monitoring purposes. This leaves EU-SILC as the only real option to calculate recent childcare attendance by socio-economic groups in a comparative manner, as also shown by the OECD work in this field. As EU-SILC is also the data source selected as the European statistical source for measuring the Barcelona target, we can consider its use for analysing ECEC attendance by socio-economic background as an extension of its original application for the Barcelona target.

The current note relies on 2016 EU-SILC data to present early childhood education and care attendance rates for the EU Member States by socio-economic background. To measure parental social status, four different categorisations are used: (1) the equivalised disposable income tertile in which the household falls; (2) mother's education level; (3) whether or not the household is at risk of poverty; (4) whether or not the household is at risk of poverty or social exclusion. Each of the four disaggregations is aimed at capturing slightly different dimensions and extent of social (dis)advantage. By comparing childcare attendance in the different social groups defined along these categories, we seek to explore possible social differences in participation in ECEC services across Member States. On the other hand, the use of different categorisations can provide insights into which dimensions better capture family background so as to identify the target

⁽¹⁾ See e.g. Cannon et al., 2017.

⁽²⁾ European Council (2002). *Presidency conclusions*. Barcelona European Council 15-16 March 2002.

⁽³⁾ OJ of the EU, 2009/C 119/02.

⁽⁴⁾ See e.g. Blaskó & Gábos (2012); Lancker & Ghysels (2012).

⁽⁵⁾ OECD (2016, 2018a, 2018b).

group of disadvantaged children, while at the same time provide reliable results. For all the four classifications, childcare attendance rates are provided for both age groups identified in the Barcelona target, namely below 3 years of age and between 3 and minimum mandatory school age.

The rest of the note is structured as follows. Section 2 describes the EU-SILC survey and the methodology used in the analysis, also drawing attention to the data limitations in measuring childcare attendance. It also provides an overview of the socio-economic background categorisations adopted. Section 3 presents the results of the analysis, while Section 4 concludes by discussing the pros and cons of each categorisation.

2 Measuring ECEC attendance with EU-SILC

2.1 The survey

EU-SILC is the EU reference source for comparative statistics on income distribution and social inclusion at the European level. The survey provides annual data for 28 European Union countries, Iceland, Norway, Switzerland and Turkey.

The reference population in EU-SILC includes all private households and their current members residing in the territory of the countries at the time of data collection. Persons living in collective households and institutions are generally excluded from the target population. All household members are surveyed, but only those aged 16 and more are interviewed.

2.2 Measuring ECEC attendance with SILC

2.2.1 Definition of care and relevant age groups

The Barcelona target based on SILC data is practically defined as ‘children cared for by *formal arrangements* other than by the family up to 30 hours a usual week / 30 hours or more a usual week as a proportion of all children in the same age group’. *Formal arrangements* include all kinds of care organised and/or controlled by a structure (whether public or private) ⁽⁶⁾, i.e.:

- pre-school or equivalent,
- compulsory education,
- centre-based services outside school hours,
- collective crèche or another day-care centre, including family day-care, and professional certified child-minders.

Age groups are identified based on the specific variable *child age*. This is defined as age at the date of interview, except for Ireland and the United Kingdom, for which it refers to the age at 31st December of year before the survey. For the 2016 wave of EU-SILC, minimum mandatory schooling age is defined for each country based on school year 2014/2015 ⁽⁷⁾.

2.2.2 Advantages and limitations of EU-SILC in measuring participation in ECEC

Keck & Saraceno (2011), Harrison Villalba et al. (2012) and Flisi et al. (2016) provide overviews of the advantages and limitations of using EU-SILC to measure participation in ECEC.

Based on these sources, the main advantages of this data source are the following:

- EU-SILC allows differentiating between **different types of formal** (and informal) **arrangements**. Such differentiation – that is normally not available in other official statistics, such as UOE administrative data ⁽⁸⁾ – can contribute to a better understanding of the picture on ECEC and the implications for policy.
- The survey provides information on the **intensity of care** on a ‘normal week’, i.e. on the time spent in each of the different types of arrangements. This is an important aspect, as it allows understanding how different arrangements are combined. Moreover, intensity of care is one of the factors taken into account in other official ECEC statistics such as UOE ⁽⁹⁾. Finally, some studies suggest that the amount of time

⁽⁶⁾ Care provided by child-minders without any structure between the carer and the parents (direct arrangements) has been excluded from the definition of ‘formal care’ in order to take into account only childcare recognised as fulfilling certain quality criteria.

⁽⁷⁾ See Eurydice (2014) for more information.

⁽⁸⁾ UOE is a joint data collection of international statistics on education and training systems administrated by the United Nations Educational, Scientific, and Cultural Organisation Institute for Statistics (UNESCO-UIS), OECD and Eurostat. It is the official data source for monitoring country performance for the ET2020 ECEC benchmark mentioned above.

⁽⁹⁾ In order to ensure international comparability of data, the UOE data collection defines a number of criteria to determine whether a programme should be recognised as early childhood education (ISCED level 0) or not. One of the criteria relates to intensity, requiring a minimum of at least two hours per day of educational activities. Other criteria require (i) having adequate intentional educational or pedagogical properties; (ii) taking place in an institutionalised setting; (iii) meeting a minimum duration (at least 100 days a year); (iv) having a regulatory framework recognised by the relevant national authorities; (v) being delivered by trained or accredited staff.

spent in ECEC – together with other factors such as duration and the quality of the educational setting – can be significantly related to later student achievement, although evidence so far is not conclusive ⁽¹⁰⁾.

- EU-SILC provides the unique opportunity to carry out more complex analyses, and in particular to relate ECEC attendance to **family and household characteristics**; this can give important insights into what factors affect access and participation to childcare.

Despite these benefits, several conceptual and methodological problems related to EU-SILC have been raised, questioning the adequacy of the data for measuring countries' performance in achieving the Barcelona target.

Harrison Villalba et al. (2012) highlight that **cross-country comparability** might be limited; there appears to be no clear consensus on whether the types of formal childcare arrangements captured by each EU-SILC variable in different educational systems are comparable, despite the homogenising effort implemented in the survey ⁽¹¹⁾. Different patterns of response across countries may be driven by the features of the national systems, and while this is not necessarily a problem per se, it can become an issue when using the survey to create common indicators for monitoring purposes. Differences between the national systems, therefore, call for careful interpretations of the data. As explained by Plantenga (2010), in France for example, national statistics consider childminders (directly paid by the parents, and accounting for a very high share of the service provided in France) as providers of formal childcare. This is however not the case with the EU-SILC definitions. In the Netherlands an opposite situation occurs, as there EU-SILC considers a wider range of provisions than national statistics do.

From a conceptual point of view, Keck & Saraceno (2011) warn that EU-SILC makes no **distinction between public and private-market childcare provision**, and therefore between services financed publicly or privately. The inclusion of private childcare – especially when not subsidized – may hide inequalities in access to and quality of services, as the lack of subsidised provision is likely to leave low-income parents without accessible and high-quality services. Similarly, Harrison Villalba et al. (2012) point out that EU-SILC does not provide insight regarding **qualitative aspects** of ECEC provisions, such as parental involvement, monitoring structure, quality assurance mechanisms, general links to national or local regulations, leadership and management within the arrangements.

From a statistical perspective, another remark concerns the **representativeness of the population of children** in SILC (Flisi et al., 2016). As a matter of fact, the survey is meant to sample private households, but not the population of children; this can create some problems regarding representativeness. To take this into account, the Barcelona target is calculated using ad-hoc weights that are supposed to adjust for the distribution of children for each year of age and ensure a correct distribution of children by age. These weights should make the age distribution of the children covered in the sample similar to the same information from some more reliable external sources (age distribution of children aged 0 to 12 in private households). Even if the use of these weights should ensure full comparability of the distribution of children for each year of age, there have been cases where problems of over- and under-representation of certain subgroups of individuals may have arisen, as it seems to be the case in Germany. As shown by Hauser (2008), there is an indication of misrepresentation of children by age groups in the German EU-SILC sample: *'[...] small children up to the age of four are clearly under-represented in EU-SILC compared with the microcensus. As age is one of the variables used to calculate the weighting of persons in EU-SILC these deviations are particularly in need of explanation. And they can also clearly distort the indicators calculated'*. In addition, it should also be noted that ensuring representativeness of the distribution of children for each year of age does not necessarily guarantee representativeness of the distribution by socio-economic group or into childcare.

2.3 Comparing ECEC attendance between groups within country using EU-SILC data

In the present analysis, childcare rates are computed based on the procedures currently in use within Eurostat ⁽¹²⁾. As a starting point, the figures provided in Eurostat online dataset [ilc_caindformal](#) were

⁽¹⁰⁾ See e.g. Cooper et al. (2010), Loeb et al. (2007).

⁽¹¹⁾ According to conversations with Eurostat colleagues, there seems to be an ongoing exercise in Eurostat to revise the current methodology for computing childcare indicators; the exercise includes a mapping of programmes that fall under the different types of childcare arrangements covered in SILC.

⁽¹²⁾ It should be noted however that according to unofficial information, the methodology is currently being reviewed. This process should improve the available documentation, which currently does not cover all the relevant aspects, and hopefully help replicability of the official indicators.

reproduced using 2016 SILC microdata. This was possible for all countries apart from Malta, for which no age variable is available in the microdata, and which therefore had to be dropped from the analysis⁽¹³⁾. The EU averages shown in the following tables, therefore, refer to the 27 EU countries available. Additionally, we also provide EU averages excluding UK, therefore referring to 26 EU countries ('EU (no UK)'). It should also be pointed out that while for 26 EU countries it was possible to replicate official Eurostat childcare statistics with marginal differences, some small discrepancies remain for Germany: for this case, the figures reproduced for the overall indicator are around half percentage point (p.p.) different from the official figures. This should be borne in mind when considering the results for Germany.

In the literature, socio-economic background is often considered as a combination of parental education, occupation, income and wealth. For measurement, usually one or more of these different dimensions are used. In our analysis, we mainly focus on the material living conditions of the children and on parental education. In particular, we use four different categorisations to investigate which of these allows for better identification of disadvantaged children – both in terms of properly selecting a target group of people in a disadvantaged situation, and of providing reliable results. The categorisations used to classify subgroups of the population are based on:

- Equivalised disposable income tertile of the household
- Mother's education level
- Risk of poverty of the household
- Risk of poverty or social exclusion of the household.

The first two are defined according to the classification adopted by OECD in the OECD Family Database, and in particular indicators on enrolment in childcare and pre-school⁽¹⁴⁾.

Following OECD, in the first classification, we distinguish children by equivalised disposable income tertile. The equivalised disposable income (variable HX090 in EU-SILC) is the total income of a household, after tax and other deductions, that is available for spending or saving, divided by the number of household members converted into equalised adults. Household members are equalised by weighting each according to their age, using the so-called modified [OECD](#) equivalence scale⁽¹⁵⁾. The income tertiles are calculated based on the distribution by equivalised disposable income of children aged less than or equal to 12. We compute tertiles at the country level. Disadvantaged children in this case are defined as those in the lowest tertile.

The second categorisation is based on the mother's education level, with children distinguished based on whether or not the reported mother of the child has attained tertiary education (highest level of education attained at International Standard Classification of Education (ISCED) 2011 levels 5–8). The education level of the female household head is used if there is no mother in the household, and then of the father (or male household head) if there is no mother or female head in the household⁽¹⁶⁾. Children whose mother's educational level is lower than tertiary are considered as disadvantaged.

The last two categorisations are based on whether or not the household where the child lives are (i) at risk of poverty (AROP) or (ii) at risk of poverty or social exclusion (AROPE). For this purpose, the definitions adopted for official EU statistics are followed⁽¹⁷⁾. Accordingly, the group of disadvantaged children is identified as those in households that are AROP/AROPE.

When comparing subpopulations within the same country, further methodological precautions need to be taken. First, as the number of observations gets reduced in the subgroup analyses, data reliability might become a problem. Eurostat guidelines for publication identify two cell size thresholds for EU-SILC cross-sectional results:

⁽¹³⁾ An attempt was made to build a proxy for age by using year of birth, but this proxy did not allow reproducing the figures provided in the Eurostat online dataset.

⁽¹⁴⁾ See Indicator [PF3.2: Enrolment in childcare and pre-school](#).

⁽¹⁵⁾ In the modified OECD equivalence scale, the first household member aged 14 years or more counts as 1 person; each other household member aged 14 years or more counts as 0.5 person; each household member aged 13 years or less counts as 0.3 person. It should be noted that the OECD Family Database adopts, for the childcare indicators, a different scale, i.e. the square root one, and therefore divides household income by the square root of household size. In our analysis, the modified OECD equivalence scale is adopted, as this is the one used to compute the equivalised disposable income variable in EU-SILC.

⁽¹⁶⁾ The person responsible for the accommodation is used as a proxy for the household head, as this information is not provided in EU-SILC. No information on the person responsible for the accommodation is available for Sweden. Children for whom it was not possible to establish a proxy for parental education are not taken into account in the calculation for this disaggregation.

⁽¹⁷⁾ The [at-risk-of-poverty \(AROP\)](#) rate is the share of people with an equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers. [At risk of poverty or social exclusion](#), abbreviated as AROPE, corresponds to the sum of persons who are either at risk of poverty, or severely materially deprived or living in a household with a very low work intensity.

- below 20 observations (unweighted sample) or if non response for the item concerned exceeds 50%, results may not be published;
- from 20 to 49 observations (unweighted sample) or if non-response for the item exceeds 20% and is lower than and equal to 50%, results may be published but are to be individually flagged.

Accordingly, in our tables, the share of children in childcare will not be presented (and flagged as confidential – ‘c’) if the overall number of children in the group analysed ⁽¹⁸⁾ is below 20, and flagged as unreliable (‘u’) if between 20 and 49.

The main purpose of the following tables is to show differences in childcare rates across subgroups within each country. When comparing statistics based on social surveys, one always needs to consider the standard error (S.E.), which is the statistic’s standard deviation of its sampling distribution. The greater this standard error, the less accurate the statistics, i.e. the greater the potential difference between the sample mean and the population mean we aim at estimating. Therefore to compare means one always needs to take into account the standard error to be able to establish if the difference is sufficiently big to be considered as statistically significant – in the case of the analysis conducted here, whether childcare rate gaps across subgroups are not likely to be due to a random error, and are therefore worth investigating. This applies when comparing childcare attendance both across different social groups within the same country and between countries.

As explained by Eurostat (2013), as the indicators based on EU-SILC are sample estimates, they should be reported along with standard errors estimates and confidence intervals, particularly if they are used for policy purposes. Di Meglio et al. (2013) explain that *‘the increased complexity of EU-SILC, the widening of the user community and the increased reliance on EU-SILC for policy targeting and evaluation, particularly since the launch of the “Europe 2020” Strategy for smart, sustainable and inclusive growth, have enhanced the need for comparable, accurate as well as workable solutions for the estimation of standard errors and confidence intervals’*. Until now, Eurostat has refrained from consistently publishing standard errors and confidence intervals alongside the official childcare indicators. However, over the last years Eurostat as well as European researchers have been dedicating increasing attention to the issue of a correct computation of SEs in SILC (see Goedemé, 2013; Di Meglio et al., 2013; Eurostat, 2013). EU-SILC is a complex survey involving different sampling designs in different countries, but unfortunately, relevant sample design variables are missing in the EU-SILC User Database.

Despite this limitation, and to give at least a first impression of the relevance of the differences between subgroups, the tables presented in the following provide significance levels of the gaps. These have been computed with an adjusted Wald test, assuming simple random sampling without stratification or clustering. This implies a potential underestimation of the real standard error, and as a consequence, more frequent significant differences between subgroups than they may be in reality. The adoption of a more refined approach to estimate SEs – possibly with the support of Eurostat – might be needed to properly evaluate country performance.

⁽¹⁸⁾ Childcare rates are computed as the share of children in childcare over the total number of children in a certain age and socio-economic background group. The (unweighted) sample size considered for the threshold is therefore the denominator in the calculation – that is the number of children in the subgroup – and not the numerator – i.e. the number of children in the group that are in childcare.

3 Results

Table 1 and Table 2 present the main results of the data analysis. As discussed above, they include ECEC participation rates for 27 Member States (Malta is missing), as well as for the EU as a whole – with and also without the UK. Overall participation rates, as well as rates by various measures of the socio-economic status of the household, are given. Table 1 presents this data for children below age 3, while in Table 2 data for children from age 3 to compulsory schooling age is provided.

Both tables provide indications (n.s.; **, ***, ****) to show whether or not the difference in participation rates between the particular subgroups – i.e. the ‘social gap’ – can be considered as statistically significant. For equivalised disposable income, the significance level refers to the difference between the 1st and 3rd tertiles, i.e. it indicates if there is a statistically significant difference in childcare participation rates of children in the lowest and the highest income groups. For all the other disaggregations, the respective significance indicates if the difference between the two subgroups defined by these criteria is significant or not.

When interpreting the differences, please bear in mind that the significance levels presented here are indicative only, as they have been computed assuming simple random sampling without stratification or clustering. As mentioned above, this possibly implies that some of the differences that appear to be significant may not be in reality. This is especially true for the differences currently appearing with a low significance level (*).

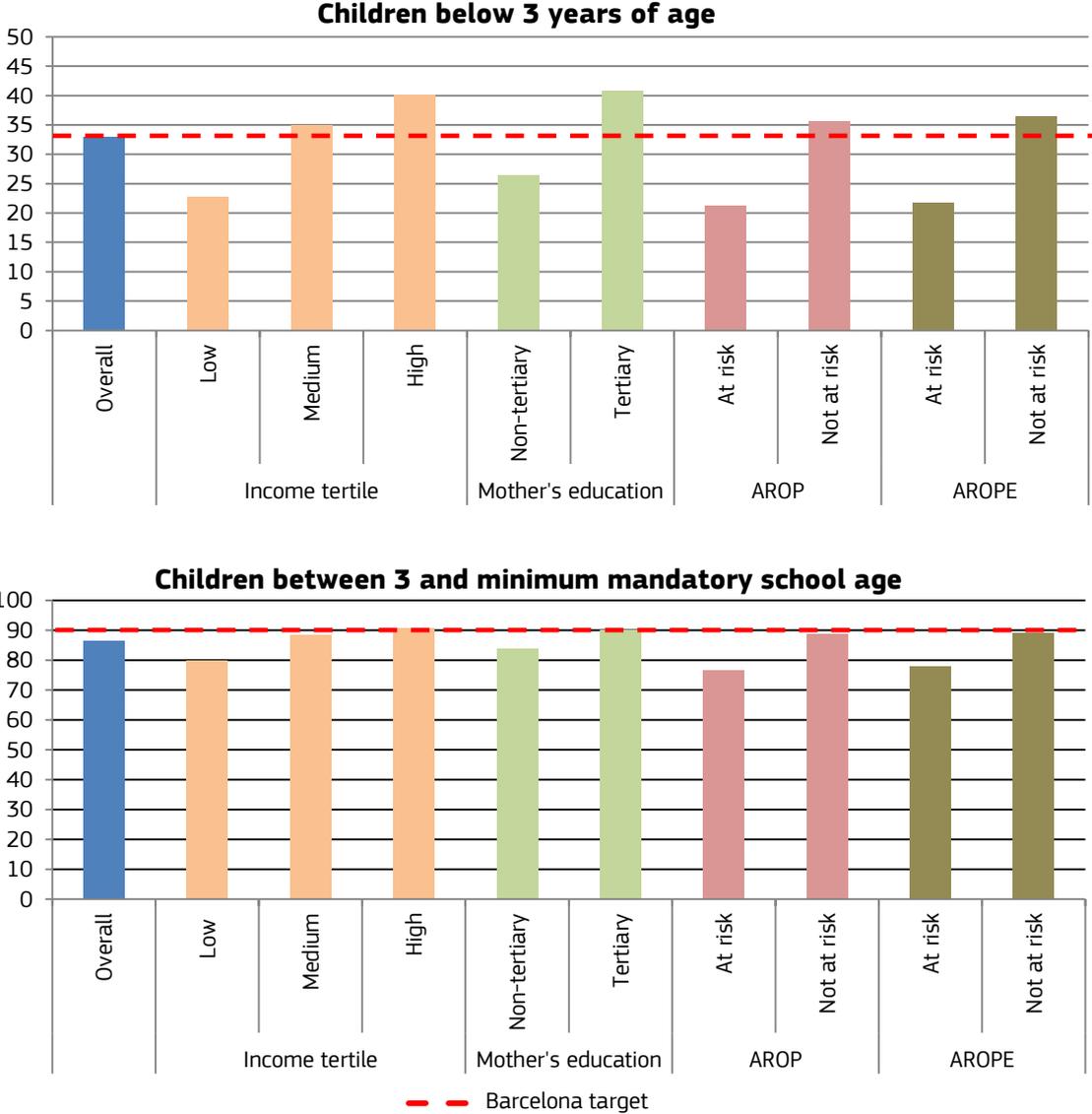
Another limitation comes from the low numbers of observations in some of the cells. As said before, childcare rates are either not presented or flagged as unreliable when below official reliability thresholds. In the latter case, results need to be interpreted with care. More information on the respective case numbers – both overall and by subgroups – is available in the Annex, in Table A1 and Table A2.

When particular subgroups in a country’s sample are too small to report reliable ECEC attendance rates, then it is also not possible to make reliable comments on the differences between such rates – what we could call a ‘social’ gap in ECEC participation.

- For the 0-2 age group, we can therefore not make any conclusion concerning social gaps in ECEC attendance in Romania, where the overall sample size is very small (99), with less than 50 observations in most of the categories discussed. Small numbers of observations in either the ‘at risk of poverty’ or the ‘at risk of poverty or social exclusion’ (or both) category prevent from making reliable conclusions for these categories also in Cyprus, Denmark and Lithuania.
- For children aged 3 and above, it is not possible to report about differences between subgroups in childcare participation in Luxemburg, and between ‘at risk’ and ‘not at risk’ groups in Cyprus, Denmark and the Netherlands.

Results do show marked differences in childcare attendance across the different social groups. Figure 1 provides an overview of attendance rates at the EU level. Among children below age 3, those who belong to disadvantaged groups show systematically lower childcare rates. This indicates that the overall achievement of the Barcelona target for this age group appears to be driven by children from a more advantaged background, who in many cases are well ahead of the target (represented by the red line in the figure), while the others are lagging behind. A similar situation – although with smaller gaps, given the higher overall attendance rates – is found among older children. Here we see that those from more advantaged households either reached the corresponding Barcelona target or are very close to doing so, while the others show systematically lower participation rates.

Figure 1. Participation in formal childcare or education, by socio-economic background (2016) – EU (% over the population of the corresponding age group)



Source: JRC calculations on 2016 EU-SILC microdata. EU includes the 27 current EU countries for which data is available (MT is missing because no age variable is available in the dataset). The red line represents the Barcelona target.

When turning to the national level, Table 1 and Table 2 show a strong tendency in both age groups for lower-status children to have lower childcare participation rates than children in the higher social strata⁽¹⁹⁾. Even taking the stricter criteria for social significance into account (i.e. considering only differences that are significant at the 0.01 level), a significant difference by at least one measure of socio-economic background can be identified in 13 countries for the younger age group and in 18 countries for the 3+ group. This also shows that significant differences in participation by socio-economic background are more frequent among older children.

The social gaps in childcare participation rates among children below 3 years of age do not necessarily correlate with the gaps found in the 3+ age category. For the younger children, the most consistent (across the four disaggregations) and most significant social differences are found in Spain, France, the Netherlands and the UK. For the older children, countries with the most remarkable gaps include Bulgaria, Finland, Croatia and Poland. The Member States where no statistically significant social gap could be identified in either of the two age groups are Denmark, Luxembourg, Romania and Sweden.

⁽¹⁹⁾ We consider here only countries where the number of observations allows for reliable comparisons.

Concerning the magnitude of the social gaps found in childcare attendance, EU averages only give a rough indication, hiding massive variations across the Member States.

- For the 0-2 age group, EU average gaps oscillate around 15 percentage points (depending on the categorisation used). On the national level, much wider gaps between the social groups are found in the Netherlands (exceeding even 40 p.p. when the risk of poverty or the risk of poverty or social exclusion is considered) and France (with a gap greater than 30 p.p. according to three criteria). On the other hand, statistically significant gaps are found in the 10 to 20 p.p. range in most of the Member States.
- For children aged 3 and above, much higher attendance rates are coupled with somewhat more moderate socio-economic gaps. On the European average, the size of the gap ranges from 6 (when mother's education is considered) to 12 p.p. (if we look at the risk of poverty). Again, cross-country variations are remarkable. Notably larger gaps are found in Croatia (above 40 or even 50 p.p.), Bulgaria and Poland (in the 20 to 30 p.p. range in all the cases). In other countries, however, statistically significant gaps remain below 20, often even below 10 p.p.

Unlike the other categorisations, differentiating by income tertiles goes beyond the simple exploration of differences between two social groups and uncovers more complexities. So far only gaps between the highest and the lowest income groups were discussed, that is the gap between the most and the least privileged groups of societies. However, also looking at the middle-income group ⁽²⁰⁾ reveals that ECEC attendance does not necessarily significantly increase with income in a linear manner, i.e. it is not always the case that the higher the household income, the more likely the children from the family are to attend childcare. In reality, in several countries, childcare rates for children of middle-income families are similar to those of children from high-income ones (i.e. childcare rates for the lowest tertile are significantly different from those of both the middle and the highest one, but no significant gap is found between tertiles 2 and 3). Examples include Belgium, Spain, Finland, France and the Netherlands for the younger age group, and Bulgaria, Poland and the UK for children aged 3 and above. An opposite pattern is evident in Ireland and the UK (for children aged 0-2), and in Italy and the Netherlands (children aged 3 and above), where children from middle-income households have participation rates that are more similar to the low- than to the high-income ones (i.e. childcare rates are not significantly different between tertile 1 and 2, but both of them are significantly lower than those for the highest income tertile).

⁽²⁰⁾ These results are based on the calculation of the level of significance of differences not only between tertile 1 and 3, but also the other combinations (tertile 1 vs 2, tertile 2 vs 3). Results are not reported here for the sake of simplicity, but are available upon request. As above, significant differences are considered here only if the p-value is below 0.01.

Table 1. Participation in formal childcare or education of children below 3 years of age, by socio-economic background (2016) - % over the population below 3 years of age

	Overall	Equivalised disposable income tertile				Mother's educational attainment			Risk of poverty			Risk of poverty or social exclusion		
		1st (lowest)	2nd	3rd (highest)	Sign. diff.	Non-tertiary education	Tertiary education	Sign. diff.	At risk	Not at risk	Sign. diff.	At risk	Not at risk	Sign. diff.
EU	33.0	22.8	35.0	40.1	***	26.4	40.9	***	21.3	35.6	***	21.7	36.4	***
EU (no UK)	33.8	23.8	36.9	39.7	***	27.3	41.8	***	22.0	36.5	***	22.4	37.2	***
AT	20.5	20.5	21.3	19.8	n.s.	19.2	22.8	n.s.	23.7	19.7	n.s.	23.6	19.6	n.s.
BE	43.8	28.0	46.7	55.5	***	34.1	50.8	**	30.0	46.4	*	30.9	46.6	*
BG	12.5	11.4	11.3	15.0	n.s.	12.8	11.9	n.s.	11.4	13.2	n.s.	10.9	14.0	n.s.
CY	24.9	12.8	38.3	25.6	*	23.5	25.9	n.s.	10.2 u	28.9	**	17.0	27.9	n.s.
CZ	4.7	4.8	3.0	6.6	n.s.	4.1	5.5	n.s.	1.5	5.2	*	2.2	5.2	n.s.
DE	32.9	28.0	40.7	31.4	n.s.	29.7	37.4	n.s.	29.9	33.4	n.s.	28.6	34.0	n.s.
DK	70.0	64.6	72.2	73.0	n.s.	73.6	67.7	n.s.	c	70.2	c	71.1	71.1	c
EE	30.2	28.1	31.5	30.7	n.s.	31.5	29.1	n.s.	27.2	30.8	n.s.	26.6	31.0	n.s.
EL	8.9	8.7	7.8	10.0	n.s.	8.8	9.0	n.s.	8.8	8.9	n.s.	7.2	9.6	n.s.
ES	39.3	24.2	39.1	50.9	***	32.0	46.4	**	24.9	43.7	***	25.5	44.0	***
FI	32.6	24.0	36.4	40.8	***	29.7	35.1	n.s.	15.0	35.6	***	22.4	35.3	**
FR	48.9	27.3	56.5	61.0	***	36.5	61.4	***	23.0	54.7	***	24.2	55.6	***
HR	15.6	8.4	16.4	22.3	*	10.3	25.6	*	9.5	16.9	n.s.	12.9	16.5	n.s.
HU	15.6	9.4	18.1	18.3	n.s.	11.0	23.3	*	5.8	17.1	*	6.6	18.5	**
IE	28.6	22.9	21.0	41.7	**	24.8	31.0	n.s.	25.8	29.1	n.s.	26.8	29.1	n.s.
IT	34.4	25.0	32.7	41.7	**	29.0	44.3	***	24.8	36.9	*	25.2	37.5	**
LT	15.2	8.8	10.8	25.8	n.s.	6.4	22.0	*	8.4 u	17.6	n.s.	6.6	19.6	*
LU	50.9	45.0	51.4	58.5	n.s.	51.4	50.4	n.s.	46.0	52.1	n.s.	45.9	52.2	n.s.
LV	28.3	23.8	28.7	31.1	n.s.	25.5	30.9	n.s.	14.2	31.1	**	19.2	31.3	*
NL	53.0	32.6	58.7	67.9	***	42.2	64.6	***	16.5	59.8	***	19.1	60.1	***
PL	7.8	6.1	4.7	11.8	*	4.6	11.4	**	6.0	8.2	n.s.	6.3	8.2	n.s.
PT	49.9	41.6	46.9	59.1	*	44.5	58.4	*	34.6	52.8	*	38.1	52.6	*
RO	17.4	c	3.1 u	27.5 u		9.0	35.2 u	n.s.	16.0 u	17.8	n.s.	16.2 u	18.1	n.s.
SE	51.0	42.6	59.0	50.2	n.s.	52.2	50.4	n.s.	43.1	53.0	n.s.	44.8	52.7	n.s.
SI	39.5	30.3	50.4	39.8	n.s.	37.2	41.7	n.s.	26.9	41.7	*	26.2	42.2	**
SK	0.5	0.0	1.4	0.0		0.8	0.0	n.s.	0.0	0.7	n.s.	0.0	0.7	n.s.
UK	28.5	17.7	25.3	41.9	***	22.0	36.1	***	17.6	30.9	***	18.5	31.9	***

Source: JRC calculations on 2016 EU-SILC microdata. Notes: c = confidential (sample of less than 20 observations); u = unreliable (between 20 and 49 observations). The column 'Sign. diff.' reports the level of significance of the difference between the subgroups for each disaggregation (and between highest and lowest tertile for the distinction by income). * p < 0.05, ** p < 0.01, *** p < 0.001; 'n.s.', difference is not significant. MT is missing because no age variable is available in the dataset.

**Table 2. Participation in formal childcare or education of children between 3 and minimum mandatory school age, by socio-economic background (2016)
- % over the population aged 3 to minimum mandatory school age**

	Overall	Equivalent disposable income tertile				Mother's educational attainment			Risk of poverty			Risk of poverty or social exclusion		
		1st (lowest)	2nd	3rd (highest)	Sign. diff.	Non-tertiary education	Tertiary education	Sign. diff.	At risk	Not at risk	Sign. diff.	At risk	Not at risk	Sign. diff.
EU	86.3	79.9	88.2	90.7	***	83.9	89.9	***	76.6	88.6	***	77.8	89.1	***
EU (no UK)	88.0	82.7	89.3	91.7	***	85.5	91.7	***	79.0	90.1	***	79.9	90.5	***
AT	88.8	82.8	88.6	95.2	**	86.5	93.4	*	84.1	89.7	n.s.	85.9	89.5	n.s.
BE	98.6	96.0	100.0	100.0	*	97.5	99.7	n.s.	97.1	98.9	n.s.	97.7	98.9	n.s.
BG	74.7	57.1	78.5	87.9	***	66.8	92.1	***	56.5	83.1	***	61.7	85.1	***
CY	78.5	66.1	81.3	89.9	**	71.3	85.1	*	63.5 u	81.8	n.s.	67.9	83.5	n.s.
CZ	80.9	74.6	84.5	84.6	*	80.1	82.7	n.s.	58.7	84.8	***	60.6	85.3	***
DE	92.5	87.7	94.2	95.7	**	91.2	94.9	n.s.	78.0	94.5	**	81.1	94.7	**
DK	95.9	92.1	99.0	96.6	n.s.	93.2	97.6	n.s.	c	98.2		83.0 u	98.0	n.s.
EE	92.8	88.1	92.7	97.5	***	89.5	95.4	**	90.1	93.4	n.s.	89.0	93.8	n.s.
EL	55.5	49.1	56.8	59.8	n.s.	53.7	57.9	n.s.	46.2	58.1	n.s.	45.6	59.8	**
ES	95.2	93.1	94.5	97.7	*	94.3	96.1	n.s.	91.5	96.4	*	91.7	96.6	*
FI	83.9	70.8	84.1	95.6	***	78.0	88.1	***	62.8	85.9	***	73.6	85.6	**
FR	94.0	90.0	96.5	94.9	n.s.	94.3	93.9	n.s.	87.4	95.3	*	88.0	95.3	*
HR	51.3	21.1	50.9	76.1	***	39.7	75.1	***	13.1	59.2	***	15.0	60.6	***
HU	86.8	88.0	81.6	90.6	n.s.	84.6	91.0	n.s.	90.6	85.7	n.s.	84.2	88.5	n.s.
IE	92.8	91.5	91.3	95.6	n.s.	87.7	95.9	**	88.5	93.7	n.s.	90.7	93.4	n.s.
IT	92.6	90.2	90.9	97.4	***	90.5	98.3	***	89.9	93.6	n.s.	89.5	94.2	*
LT	78.4	71.3	77.6	84.5	n.s.	68.0	85.7	**	60.2	82.7	**	66.7	82.4	*
LU	87.1	90.3 u	72.8 u	97.9 u	n.s.	81.8	93.9 u	n.s.	c	87.9		83.0 u	87.8	n.s.
LV	81.9	69.9	84.9	93.2	***	76.4	87.7	*	70.2	84.9	*	73.4	84.5	n.s.
NL	93.5	88.6	92.6	99.1	***	91.3	95.3	n.s.	94.7 u	93.3	n.s.	94.6	93.3	n.s.
PL	61.0	43.4	65.2	72.6	***	52.0	72.5	***	37.2	66.3	***	41.9	66.2	***
PT	92.0	86.5	92.8	96.7	**	89.8	96.4	*	87.5	93.1	n.s.	88.8	92.9	n.s.
RO	60.8	56.1	64.3	62.3	n.s.	56.6	71.7	n.s.	58.3	62.2	n.s.	59.7	61.9	n.s.
SE	96.7	94.4	97.7	98.0	n.s.	95.2	97.9	n.s.	95.2	96.9	n.s.	94.1	97.2	n.s.
SI	89.9	87.5	89.8	92.1	n.s.	88.7	91.0	n.s.	83.2	90.8	n.s.	81.1	91.4	*
SK	77.3	69.8	78.0	83.7	*	76.3	78.9	n.s.	61.0	81.0	**	61.2	81.4	**
UK	73.4	59.5	79.0	82.7	***	69.3	77.7	*	56.7	77.0	***	63.4	77.2	**

Source: JRC calculations on 2016 EU-SILC microdata. Notes: c = confidential (sample of less than 20 observations); u = unreliable (between 20 and 49 observations). The column 'Sign. diff.' reports the level of significance of the difference between the subgroups for each disaggregation (and between highest and lowest tertile for the distinction by income). * p < 0.05, ** p < 0.01, *** p < 0.001; 'n.s.', difference is not significant. MT is missing because no age variable is available in the dataset.

4 Conclusions

The present analysis reveals that reaching the Barcelona target is not an achievement that all social groups can equally enjoy. Instead, we find a clear tendency of lower ECEC participation rates for children from a lower socio-economic background than for those from a higher one, i.e. a social gap in childcare attendance, which is evident in several Member States. In other words, in many countries children from socially disadvantaged groups do not fully enjoy the potential benefits of ECEC, and are still far from reaching the Barcelona target. This finding justifies the attempt to look at alternative options for targets related to ECEC participation, focusing on the socially disadvantaged children rather than on the overall population.

The size – and indeed the mere existence – of the social gap found not only varies by country, but also depends on what social groups and which age brackets are considered. The analysis also draws attention to the importance of considering the level of statistical significance when comparing indicators across subgroups; even seemingly large differences can be statistically irrelevant, especially when the underlying sample size is limited.

It is important to note that EU targets are normally defined with reference to a specific target group, and aim at cross-country comparisons of performance for that group only. When focusing on ECEC participation of children from a disadvantaged socio-economic background, however, there is an additional component to be taken into account (even within a single country), i.e. the comparison to other children's ECEC attendance in the same country. Only by comparing the different socio-economic groups can we understand – for example – whether the low participation rate of the disadvantaged is due to the generally low levels of ECEC participation in the country, or whether there are (also) inequality problems behind. Without a reference category, very little can be learned from the attendance rate reported for disadvantaged children.

In this overview, the socio-economic background is operationalised in four distinct ways, each dividing the population into more and less advantaged social groups along different dimensions. The purpose of using different categorisations is to investigate which one is better able to capture family background, with a view to building a possible ECEC target or indicator. Accordingly, a categorisation can be evaluated on the basis of three different factors: (i) its ability to identify a group of disadvantaged children with significantly lower participation in ECEC than their more advantaged peers ⁽²¹⁾; (ii) the level of reliability of the results, especially in terms of underlying sample sizes; (iii) the ease of understanding of an indicator based on it. Although the social gap in ECEC participation is apparent in several countries no matter which categorisation is applied, there are some clear differences between the various approaches that are worth highlighting.

In the literature, socio-economic background is normally considered to be a combination of parental education, occupation and income/wealth. Three of the four categorisations used in the analysis take into account – more or less directly – the children's living conditions, proxied by income, material deprivation and work intensity in the household. The only one that does not do so, i.e. the categorisation of children by mother's education, is the one that shows, on average, the smallest and least significant gaps between advantaged and disadvantaged children. While widely recognised as a relevant determinant of children outcomes, parental education therefore appears not to be able to identify a good target group for ECEC participation; the population singled out with this approach most likely represents a broad and potentially too diverse group of children. Despite the good level of reliability, and despite being a rather straightforward classification to grasp, this categorisation does not qualify as an optimal candidate for a potential ECEC indicator.

As mentioned, the other classifications consider more closely the economic situation of the children's families and their standards of living. Out of the three, the measure based on equivalised income tertiles has the advantage of guaranteeing in most cases the highest sample size. In identifying the disadvantaged group with the lowest income tertile, by definition this categorisation ensures that the underlying sample is around one-third of the overall one in the corresponding age group. Consequently, there is very little risk to lose a country due to unreliable sample size. On the downside, a disaggregation by income tertile is not so widely used for indicators by policy-makers, and possibly more difficult to interpret and communicate to a wider audience. The lowest income tertile is also a somewhat arbitrary choice: on one hand, other quantiles (e.g. quartiles or quintiles) represent equally relevant alternative options; on the other, from a conceptual point of view, one could argue that the lowest tertile does not identify a situation of economic disadvantage in absolute terms.

⁽²¹⁾ While a potential ECEC target or indicator might focus only on the group of children from a disadvantaged socio-economic background, we deem it necessary to identify such background based on the existence of a significant gap in ECEC participation between the two groups. If no significant gap exists, then no condition of disadvantage is found.

The last two measures, on the other hand, are more widely acknowledged measures of disadvantage. Both AROP and AROPE are well-established living conditions indicators of Eurostat and of the EU2020 Strategy. This also implies that they would be easier to grasp and interpret for a wide audience, which makes them more suitable for a policy-relevant indicator. Results show that indeed in many countries, a statistically significant disadvantage in ECEC participation is found when using these categorisations. From a merely technical point of view, using AROP has more limitations: in 2016, in four EU countries EU-SILC does not offer a sufficient sample size of children in this subgroup. As the identification of people at risk of poverty or social exclusion takes into account not only income poverty but also low work intensity and material deprivation, children in households affected by at least one of these three conditions represent by definition a broader category than AROP. Using AROPE therefore ensures better sample sizes, allowing calculating the respective ECEC rates in all but two Member States ⁽²²⁾. Moreover, when compared to AROP, the AROPE classification arguably identifies disadvantages in more absolute terms; while the former is capturing situations of 'relative poverty', the condition of material deprivation taken into account in the latter also covers an 'absolute poverty' component. These considerations suggest that the AROPE categorisation is likely to be superior to the AROP one for our purposes.

In conclusion, the disaggregations by income tertile and by AROPE appear to be the main candidates for a potential ECEC indicator. The former normally ensures bigger sample sizes than the latter, and therefore more reliable estimates. However, AROPE is a more precisely defined concept for capturing situations of disadvantage. Moreover, the AROPE classification is more widely recognised and understood, and therefore might be better suited for policy purposes.

⁽²²⁾ In Denmark, sample sizes for people who are AROP and AROP are not sufficiently high to produce reliable calculations, in either of the two age groups. Sample size is also an issue in Romania (for children below 3 years of age) and Luxembourg (for older children), not only for AROP and AROPE, but for all categorisations.

References

- Barnett, W. S., & Belfield, C. R. (2006). Early childhood development and social mobility. *The Future of Children*, 73–98.
- Blaskó, Z., & Gábos, A. (2012). Redistribution effects of the childcare system in Hungary - Who is cared for? (p. 19). Retrieved from Budapest Intézet website: http://www.budapestinstitute.eu/uploads/V4_child_care_enrolment_HU1.pdf
- Cannon, J., Kilburn, M., Karoly, L., Mattox, T., Muchow, A., & Buenaventura, M. (2017). *Investing Early: Taking Stock of Outcomes and Economic Returns from Early Childhood Programs*. <https://doi.org/10.7249/RR1993>
- Cooper, H., Allen, A. B., Patall, E. A. & Dent, A. L. (2010). Effects of full-day kindergarten on academic achievement and social development. *Review of Educational Research*, vol. 80(1): 34-70.
- Di Meglio, E., G. Osier, T. Goedemé, Y. G. Berger, and E. Di Falco (2013). Standard Error Estimation in EU-SILC – First Results of the Net-SILC2 Project. In Proceedings of the Conference on New Techniques and Technologies for Statistics. Available at: http://www.crosportal.eu/sites/default/files//NTTS2013%20Proceedings_0.pdf
- Elango, S., García, J. L., Heckman, J. J., & Hojman, A. (2015). Early Childhood Education, in: *Economics of Means-Tested Transfer Programs in the United States*, Volume 2, pages 235-297 National Bureau of Economic Research, Inc.
- Esping-Andersen, G. (2004). Untying the Gordian Knot of Social Inheritance. *Research in Social Stratification and Mobility*, 21, 115–139.
- Esping-Andersen, G., Garfinkel, I., Han, W.-J., Magnuson, K., Wagner, S., & Waldfogel, J. (2012). Child care and school performance in Denmark and the United States. *Children and Youth Services Review*, 34(3): 576–589. <https://doi.org/10.1016/j.childyouth.2011.10.010>
- Eurostat (2013). *Standard error estimation for the EU-SILC indicators of poverty and social exclusion*. Luxembourg: Publications Office of the European Union, 2013. doi:10.2785/45575
- Eurydice (2014). The structure of the European education systems 2014/15: Schematic Diagrams.
- Flisi, S., Meroni, E. and Vera-Toscano E. (2016). *Indicators for early childhood education and care*. EUR 28132 EN. Publications Office of the European Union, Luxembourg, 2016. doi:10.2791/550118.
- Goedemé (2013). How much Confidence can we have in EU-SILC? Complex Sample Designs and the Standard Error of the Europe 2020 Poverty Indicators. *Soc Indic Res*, 110:89–110. DOI 10.1007/s11205-011-9918-2
- Harrison Villalba, C., E. Villalba and L.Araujo (2012) *Advantages and limitations of using EU-SILC for monitoring participation in Early Childhood Education and Care*. JRC Scientific and Policy Reports. Publications Office of the European Union, 2012. JRC 76063
- Keck, W., & Saraceno, C. (2011). Comparative childcare statistics in Europe. Conceptual and methodological fallacies (No. 229) (p. 12). Collegio Carlo Alberto. Retrieved from <https://carloalberto.it/assets/working-papers/no.229.pdf>
- Lancker, W. V., & Ghysels, J. (2012). Who benefits? The social distribution of subsidized childcare in Sweden and Flanders. *Acta Sociologica*, 55(2), 125–142. <https://doi.org/10.1177/0001699311433428>
- Loeb, S., Bridges, M., Bassok, D., Fuller, B., & Rumberger, R. W. (2007). How much is too much? The influence of preschool centers on children's social and cognitive development. *Economics of Education Review*, 26(1): 52-66.
- OECD. (2016). *Who uses childcare? Background brief on inequalities in the use of formal education and care (ECEC) among very young children*. Retrieved from https://www.oecd.org/els/family/Who_uses_childcare-Backgrounder_inequalities_formal_ECEC.pdf
- OECD (2017), *Starting Strong 2017: Key OECD Indicators on Early Childhood Education and Care*, Starting Strong, OECD Publishing, Paris, <https://doi.org/10.1787/9789264276116-en>.
- OECD (2018a), *Education at a Glance 2018: OECD Indicators*, OECD Publishing, Paris. <http://dx.doi.org/10.1787/eag-2018-en>
- OECD (2018b). *PF3_2: Enrolment in childcare and pre-school*. Retrieved from http://www.oecd.org/els/soc/PF3_2_Enrolment_childcare_preschool.pdf

List of abbreviations and definitions

Country codes

AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czechia
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
MT	Malta
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
SE	Sweden
SI	Slovenia
SK	Slovakia
UK	United Kingdom

Abbreviations

AROP	At risk of poverty
AROPE	At risk of poverty or social exclusion
ET 2020	Education and Training 2020
EU	European Union
EU-SILC	EU Survey on income and living conditions
ISCED	International Standard Classification of Education
OECD	Organisation for Economic Co-operation and Development
UOE	UIS (UNESCO Institute of Statistics)/OECD/Eurostat data collection
PISA	Programme for International Student Assessment
SE	Standard Error

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Table A1. EU-SILC sample size for children below 3 years of age, by socio-economic background (2016)

	Overall	Equivalised disposable income tertile			Mother's educational attainment		Risk of poverty		Risk of poverty or social exclusion	
		1st (lowest)	2nd	3rd (highest)	Non-tertiary education	Tertiary education	At risk	Not at risk	At risk	Not at risk
EU	13587	4387	4585	4615	7161	6375	2447	11140	3108	10479
EU (no UK)	12710	4082	4309	4319	6701	5959	2282	10428	2870	9840
AT	390	126	123	141	229	161	66	324	78	312
BE	414	138	139	137	178	230	77	337	88	326
BG	276	108	91	77	213	63	108	168	137	139
CY	258	88	75	95	112	146	(b)	212	67	191
CZ	475	129	183	163	261	214	57	418	73	402
DE	500	174	142	184	289	210	81	419	105	395
DK	292	70	117	105	91	198	(a)	284	(a)	275
EE	462	167	170	125	239	223	89	373	100	362
EL	781	265	250	266	464	317	187	594	252	529
ES	802	230	258	314	398	403	194	608	218	584
FI	853	305	287	261	343	490	91	762	134	719
FR	726	237	264	225	376	350	134	592	151	575
HR	342	114	115	113	241	101	65	277	86	256
HU	409	147	140	122	294	115	74	335	130	279
IE	549	176	177	196	195	347	89	460	138	411
IT	872	203	292	377	569	303	157	715	204	668
LT	166	58	58	50	74	92	(b)	121	59	107
LU	328	121	103	104	175	153	64	264	68	260
LV	358	111	113	134	181	177	61	297	90	268
NL	683	170	273	240	299	382	59	624	70	613
PL	877	322	275	280	470	401	183	694	201	676
PT	436	155	128	153	274	162	104	332	120	316
RO	99	(a)	(b)	(b)	69	(b)	(b)	76	(b)	65
SE	448	130	179	139	175	269	68	380	72	376
SI	622	226	205	191	304	318	85	537	98	524
SK	292	93	109	90	188	104	67	225	80	212
UK	877	305	276	296	460	416	165	712	238	639

Source: JRC calculations on 2016 EU-SILC microdata. Notes: a = sample of less than 20 observations; b = sample between 20 and 49 observations.

Table A2. EU-SILC sample size for children between 3 and minimum mandatory school age, by socio-economic background (2016)

	Overall	Equivalent disposable income tertile			Mother's educational attainment		Risk of poverty		Risk of poverty or social exclusion	
		1st (lowest)	2nd	3rd (highest)	Non-tertiary education	Tertiary education	At risk	Not at risk	At risk	Not at risk
EU	15063	4761	5142	5160	8205	6802	2638	12425	3374	11689
EU (no UK)	14507	4558	4961	4988	7920	6534	2538	11969	3214	11293
AT	395	114	145	136	250	145	54	341	61	334
BE	515	189	162	164	253	254	104	411	130	385
BG	514	170	187	157	369	145	169	345	233	281
CY	221	69	67	85	101	120	(b)	190	61	160
CZ	524	182	169	173	351	173	68	456	87	437
DE	551	184	202	165	353	197	71	480	94	457
DK	328	81	125	122	112	214	(a)	311	(b)	302
EE	662	238	251	173	352	310	131	531	150	512
EL	666	200	228	238	393	273	148	518	200	466
ES	1023	279	354	390	517	505	228	795	256	767
FI	1338	394	436	508	512	809	103	1235	148	1190
FR	854	278	278	298	462	389	152	702	175	679
HR	285	84	96	105	189	96	54	231	67	218
HU	292	126	91	75	212	78	69	223	126	166
IE	578	168	196	214	222	350	96	482	130	448
IT	1213	332	424	457	869	344	240	973	318	895
LT	328	113	104	111	146	182	74	254	95	233
LU	112	(b)	(b)	(b)	66	(b)	(a)	93	(b)	92
LV	249	94	81	74	130	119	55	194	61	188
NL	534	138	195	201	217	315	(b)	491	52	482
PL	679	257	213	209	375	296	157	522	174	505
PT	622	216	203	203	414	208	135	487	166	456
RO	231	70	82	79	174	57	78	153	106	125
SE	642	163	243	236	249	390	64	578	72	570
SI	684	221	231	232	344	340	82	602	94	590
SK	467	158	162	147	288	179	96	371	112	355
UK	556	203	181	172	285	268	100	456	160	396

Source: JRC calculations on 2016 EU-SILC microdata. Notes: a = sample of less than 20 observations; b = sample between 20 and 49 observations.

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doi:10.2760/315380

ISBN 978-92-76-09694-8