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# MATERIAL AND SOCIAL DEPRIVATION IN THE EUROPEAN UNION: COUNTRY-LEVEL ANALYSIS

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**ABSTRACT.** The study focuses on material and social deprivation as an important aspect of quality-of-life research in the European Union (EU). It analyses thirteen material and social deprivation items considered by the Eurostat. The study aims to compare country rankings based on severe material and social deprivation rates and country rankings obtained from composite indicators covering thirteen material deprivation items. Additionally, using Eurostat data, it evaluates material and social deprivation across EU countries in 2015-2022. The study employs different normalization and weighting methods to construct the composite indicators for country-level data. The results obtained through various methods are observed to exhibit a high degree of concordance. In particular, the severe material and social deprivation rate was found to be a good representative of material and social deprivation in a multidimensional approach. Regardless of the method used, throughout the analyzed period, Bulgarians and Romanians were in the worst situation within the EU. Slovenia and Cyprus improved their situation the most compared to other EU countries, while France, Germany, and Spain notably worsened their position between 2015 and 2022.

**JEL Classification:** F63, I32,  
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## Introduction

Quality of life (QoL) is a complex multidimensional concept that covers not only standard economic measures, such as gross domestic product (GDP), but also various indicators related to people's well-being. There is a broad consensus that GDP cannot reflect all aspects of the QoL of the population, although it has been extensively used as a traditional approach for measuring a country's wealth in terms of economic growth (Rogge & Nijverseel, 2019). Thus, the need to measure the QoL as a multidimensional concept has been the main objective of researchers, policymakers, and institutes. They have developed various measures of a country's quality of life, mostly aggregating the subjective and objective dimensions into an index rather than measuring the QoL with a traditional GDP approach (Boitan & Costica, 2020). However, there is no standard definition nor a method for the selection of indicators describing

QoL (Nováková & Šoltés, 2016). The European Commission (EC) has emphasized the need for improved data that provides more comprehensive information for measuring well-being and QoL in its report on ‘GDP and beyond’ (Decancq & Schokkaert, 2015; European Commission, 2009). The importance of collecting data to measure the quality of life and sustainable development as a multidimensional concept has been addressed in the European Commission’s Stiglitz–Sen–Fitoussi report (2009). This report emphasized that the QoL is a broader concept that covers economic and non-economic indicators, listing indicators such as health, education, personal activities, political voice and governance, social connections, environmental conditions, personal insecurity, and economic insecurity as the objective features shaping the quality of life and subjective features related to people’s well-being.

Some researchers (Watson et al., 2017) restrict their attention to a narrower concern with poverty and social exclusion rather than a wider focus on QoL because a lower QoL corresponds to a higher degree of poverty (Ma et al., 2019). Poverty is defined chiefly as not having enough income to meet the basic needs of individuals or households. However, most of the studies have focused on its multidimensional nature, which considers the different aspects of life, such as health, education, employment status, housing, and income level since individuals with the same income can experience poverty at different levels of deprivation. The most popular example of measuring poverty that extends beyond monetary-based measures is the Global Multidimensional Poverty Index (MPI) developed by the Oxford Poverty and Human Development Initiative (OPHI). The MPI hinges on the capability approach proposed by Sen (1985) and Nussbaum (2000). It measures poverty by capturing the deprivations in health, education, and living standards to complement the classical monetary-based calculations. The Human Development Index (HDI) proposed by the United Nations Development Programme (UNDP) is also computed based on the capability approach (Decancq & Schokkaert, 2015). The HDI reflects poverty in terms of well-being and what human development entails.

In the European Union (EU), an important dimension included both in the measurement of poverty and social exclusion and in the measurement of quality of life is material deprivation (MD). The importance of MD indicators has grown significantly since 2010, as a result of the adoption of the Europe 2020 Strategy on smart, sustainable, and inclusive growth, with its five ‘headline targets’ to be achieved by 2020 (Guio et al., 2016; Marlier et al., 2010). The poverty target is monitored through the headline indicator ‘people at risk of poverty or social exclusion’. The indicator consists of three sub-indicators covering severe material deprivation, monetary poverty, and very low work intensity. Definitions of these sub-indicators can be found in the literature, e.g. (Guio et al., 2016). For the purposes of this study, it is worth mentioning that, the severe material deprivation rate (the SMD rate) is a sub-indicator that measures the percentage of the population that cannot afford at least four of the considered 9 items.

The new indicator for material and social deprivation (MSD), validated by the European Commission in 2014, encompasses both the material hardship experienced by individuals and households and a significant social dimension (Fabrizzi et al., 2023). This measure, developed by Guio et al. (2012), encompasses the entire population of the EU Member States. It includes 13 deprivation items and replaces the 9-item ‘standard’ material deprivation approach adopted in 2009 by the then 27 EU countries and the European Commission, to monitor progress in the fight against poverty and social exclusion at the national and EU levels (Gordon et al., 2017). The severe material and social deprivation rate (the SMSD rate) is an EU indicator that shows an enforced lack of necessary and desirable items to lead an adequate life. The indicator distinguishes between individuals who cannot afford a certain good, service or social activity from those who do not have it for another reason. It is defined as the proportion of the population

experiencing an enforced lack of at least 7 out of 13 deprivation items (7 related to the household and 6 related to the individual) (Eurostat, 2022a).

List of items at a household level:

- 1) capacity to face unexpected expenses (the short name: ‘unexpected expenses’),
- 2) capacity to afford paying for a one-week annual holiday away from home (the short name: ‘holiday’),
- 3) capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase instalments or other loan payments) (the short name: ‘arrears’),
- 4) capacity to afford a meal with meat, chicken, fish or vegetarian equivalent every second day (the short name: ‘food’),
- 5) ability to keep home adequately warm (the short name: ‘warm home’),
- 6) have access to a car/van for personal use (the short name: ‘car’),
- 7) replacing worn-out furniture (the short name: ‘furniture’).

List of items at an individual level:

- 1) having an internet connection (the short name: ‘internet’),
- 2) replacing worn-out clothes with new ones (the short name: ‘clothes’),
- 3) having two pairs of properly fitting shoes (including a pair of all-weather shoes) (the short name: ‘shoes’),
- 4) spending a small amount of money each week on him/herself (the short name: ‘money’),
- 5) having regular leisure activities (the short name: ‘leisure’),
- 6) getting together with friends/family for a drink/meal at least once a month (the short name: ‘friends’).

The MSD approach is a direct approach to measuring poverty and an absolute measure different from the income poverty approach (Verbunt & Guio, 2019), in which a poverty line is created relative to individuals in a country or a country group.

In this study, we consider all 13 MSD items and generate various composite indicators. We aim to assess whether the SMSD rate effectively captures the multidimensional nature of MSD. Employing several methods, we derive composite indicators and contrast our findings with those based on the SMSD rate. The study also evaluates countries in terms of quality of life in the EU, utilizing MSD approaches as a measure for it. Consequently, all indicators and remarks pertaining to the country rankings in the study are applicable to the assessment of the quality of life in EU countries.

In this context, we aim to address the following research questions (RQ):

(RQ1): Do the country rankings produced by composite indicators align with the rankings generated by the SMSD rate?

(RQ2): Which composite indicator yields a ranking closest to the ranking generated by the SMSD rate?

(RQ3): Do the country rankings based on MSD indicators remain constant over time?

(RQ4): Which countries exhibited the most significant changes in MSD between 2015 and 2022?

Our objective in the paper is, therefore, to contribute to the existing literature on quality-of-life indices not only by constructing composite indicators of MSD but also by showing whether, from an empirical point of view, meaningful differences in results exist between the two analyzed approaches – the SMSD rate approach and the approach using composite indicators. Moreover, the study aims to assess MSD across EU countries for the 2015-2022 period.

The remainder of the paper is structured as follows: In Section 1, we offer a brief literature review. Details regarding the data and methods employed are presented in Section 2. Section 3 encompasses the presentation of results and discussion. Finally, Section 4 of the paper provides concluding remarks.

## 1. Literature review

There are currently many scientific papers devoted to material deprivation. The research literature includes studies on MD at the individual and household levels (Mussida & Parisi, 2021; Dudek & Szczesny, 2021; Šoltés & Ulman, 2015) as well as at the regional or country level (Dudek & Sedefoğlu, 2019; Łuczak & Kalinowski, 2020; Ciacci & Traversa, 2021). Most of the authors concentrate on factors influencing MD in their research. When analysing data at the national or regional level, the aim of the research is to identify the determinants of the SMD rate (Dudek & Sedefoğlu, 2019; Dudek, 2019) or ranks of countries with respect to MD (Łuczak & Kalinowski, 2020; Ciacci & Traversa, 2021). In the first group of papers, it was shown that the SMD rate is positively correlated with the at-risk-of-poverty gap and long-term unemployment rate and negatively correlated with disposable income, GDP per capita, and share of social protection expenditure in GDP. Moreover, it was found that relationships between the SMD rate and the above variables are nonlinear. In the second group of papers, the authors focus on quantitative methods providing the ranks of countries. Łuczak and Kalinowski (2020) assessed MD in EU countries in 2016 using the TOPSIS method. Ciacci and Traversa (2021) determine how MD evolved from 2005 to 2019 using the Adjusted Mazziotta and Pareto Index (AMPI). They indicate that after the introduction of the Europe 2020 strategy, even if with some trouble, most of the countries have undertaken an improving process of the population's living conditions.

The literature on material and social deprivation is very scarce. One of the few exceptions is the Fabrizio's et al. (2023) research, in which the occurrences of MD and MSD were analyzed in 21 EU countries in 2019. It reveals that the two indicators (old and new) provide different information about the characteristics of the groups related to deprivation. So far, however, there is still a lack of studies on the use of indicators covering all 13 items of MSD. Thus, our study aims to fill a gap in the area of indicators used in the analysis of material and social deprivation in the EU.

## 2. Data and methods

Our analysis covers the period from 2015 to 2022, and encompasses all 27 EU Member States. We obtained secondary data from the Eurostat database concerning the indicators of MSD for the research methods we used. We build composite indicators for 2015 and 2022 – the most recent year for which we have complete data on all MSD items except one of the individual level items – having two pairs of properly fitting shoes. However, we compute the missing values of the item from the EU Statistics on Income and Living Conditions (EU-SILC) microdata to complete the whole data. Consequently, we compare rankings of countries generated by the SMSD rate and several composite indicators for 2015 and 2022.

There are several approaches to creating composite indicators (Nardo et al., 2005; Floridi et al., 2011).

The basic steps commonly applied are (see Floridi et al., 2011):

1. Normalization of data.
2. Weighting and aggregation of indicators.

In the first step, the input values of all indicators are normalized to render them comparable. This study deals with two types of data normalization: so-called min-max and standardization procedures.

According to the min-max procedure, also called the zero unitarization method, the individual value of the indicator  $x_j$  for the  $i$ -th country is transformed into the score  $z_{ji}$ :

$$z_{ji} = \frac{x_{ji} - \min(x_{ji})}{\max(x_{ji}) - \min(x_{ji})}, \quad (1)$$

where  $\min(x_{ji})$  and  $\max(x_{ji})$  are the minimum and the maximum values of  $x_{ji}$  across the countries,  $j=1,2,\dots,13$  and  $i=1,2,\dots,27$ . Therefore, the min-max procedure normalizes indicators to have an identical range  $[0, 1]$  by subtracting the minimum value and dividing it by the range of the indicator values.

According to the standardization score, also called z-score,  $z_{ji}$  are calculated as:

$$z_{ji} = \frac{x_{ji} - \bar{x}_j}{S(x_j)} \quad (2)$$

where  $S(x_j)$  is the standard deviation,  $\bar{x}_j$  is the average for each indicator  $x_j$  calculated across countries. The z-score for a country is then calculated as the ratio of the difference between the raw indicator value and the average divided by the standard deviation. This type of normalization is commonly used because it converts all indicators to a common scale with an average of zero and a standard deviation of one.

In the second step, the deprivation items need to be weighted and aggregated to derive a multidimensional MSD indicator. Thus, we define the deprivation score for the  $i$ -th country as the weighted sum of thirteen deprivation items:

$$s_i = \sum_{j=1}^{13} w_j z_{ji}, \quad (3)$$

where  $w_j$  is a weight reflecting the relative importance of  $j$ -th item, wherein  $0 \leq w_j \leq 1$  and  $\sum_{j=1}^{13} w_j = 1$ .

Most composite indicators rely on equal weighting, i.e., all variables are given the same weight. In our study, we use both equal weights and unequal weights. We apply Cerioli & Zani's (1990) and Betti & Verma's (2008) methods in the second approach. Cerioli & Zani (1990) suggest the formula

$$\omega_j = \ln \frac{1}{\bar{z}_j}, \quad (4)$$

where  $\bar{z}_j$  denotes the mean of the item  $z_j$ . Therefore, Cerioli & Zani's (1990) method assigns higher weights to relatively infrequent deprivation items to reflect the view that suffering from a 'rare' deprivation takes a greater toll on people's standard of living (Cerioli & Zani, 1990; Hildebrand et al., 2017).

To sum to one, values (4) are normalized:

$$w_j = \frac{\omega_j}{\sum_{j=1}^K \omega_j}, \quad (5)$$

where  $K$  is the number of items, i.e.  $K=13$  in our study.

Betti & Verma (2008) method comprises two factors: the dispersion of the deprivation indicator and its correlation with other deprivation indicators. According to this methodology, the weights can be defined as follows:

$$W_j = W_j^a \cdot W_j^b, \quad (6)$$

where the first factor is the coefficient of variation of the item and the second factor is a measure that gives less weight to items more highly correlated with others to reduce the effect of redundancy. An accurate formulation of factor  $W^b$  is provided by Betti & Verma (2008 and 2015):

$$W_j^b = \left( \frac{1}{1 + \sum_{k \neq j} r_{kk'} |r_{kk'}| < r^*} \right) \cdot \left( \frac{1}{\sum_{k \neq j} r_{kk'} |r_{kk'}| \geq r^*} \right), \quad (7)$$

where  $r_{kk'}$  is the correlation coefficient between two different indicators  $Z_k$  and  $Z_{k'}$  and  $r^*$  is a predetermined cut-off correlation level.

Finally,  $W_j$  are normalized to sum to one according to (5). We compute weights by the use of `mdepriv` – the Stata procedure developed by Pi Alperin & Van Kerm (2014). As Cerioli & Zani (1990) and Betti & Verma (2008) methods require no negative normalized data values, we applied the min-max procedure for these methods.

To sum up, we used four composite indicator methods:

- 1) Equal weighting with z-scores (short name: z-scores),
- 2) Equal weighting with the min-max procedure (short name: min-max),
- 3) Cerioli & Zani (1990) weighting with the min-max procedure (short name: C-Z),
- 4) Betti & Verma (2008) weighting with the min-max procedure (short name: B-V).

Statistical dependence between rankings generated by the SMSD rate and composite indicators was analyzed using Spearman's rank correlation coefficient (Nardo et al., 2005; Ostasiewicz, 2012).

### 3. Results and discussion

*Figure 1* depicts the maps of EU countries to compare the changes in the SMSD rates for 2015 and 2022. The colour scale is divided into nine categories, and the colours on the map change from green to red with the increase in SMSD rates. Grey-coloured countries are not included in the analysis.

In 2015, Finland, Sweden, Luxembourg, Austria, Denmark, Netherlands, and Estonia showed the lowest SMSD rates and coloured in the darkest green. The Czech Republic, Slovenia, Germany, France, Belgium, Spain, Poland, and Cyprus are in the second category on the map having SMSD rates of 4-8%. Malta, Croatia, Slovakia, Ireland, and Portugal come after these countries with 8-12% SMSD rates. Italy, Lithuania, and Latvia are illustrated in the category of 12-16% on the map. However, Bulgaria and Romania demonstrated the highest SMSD rates, coloured in the darkest red in 2015, and Hungary and Greece followed Bulgaria and Romania that year, as shown on the map in the categories of 24-28% and 16-20%, respectively. In 2022, the number of countries with the darkest green colour increased, reaching 11 from 7. The countries with the lowest SMSD rates, between 0-4%, are Slovenia, Finland, Luxembourg, The Czech Republic, Austria, Sweden, Netherlands, Cyprus, Poland, Denmark, and Estonia. It is followed by Croatia, Italy, Malta, Portugal, Belgium, Ireland, Lithuania, Germany, Slovakia, Spain, France, and Latvia with 4-8%. Hungary is the only country defined in the category of 8-12%. On the other hand, the country with the highest SMSD rate among the EU countries is Romania. Bulgaria and Greece come after Romania subsequently.

To sum up, there is no country in dark red colour on the map for 2022, as the highest SMSD rates fall in the 24-28% range, and the homogeneity has increased in EU countries compared to 2015. Countries are mainly grouped in 0-4% and 4-8% categories in terms of SMSD rates. Moreover, Bulgaria and Hungary showed the highest decline in 2022, more than 10 p.p. compared to 2015, and followed by Romania, Lithuania, Italy, and Latvia. Overall, the quality of life in EU countries improved between 2015 and 2022, concurrent with the decrease in SMSD rates.

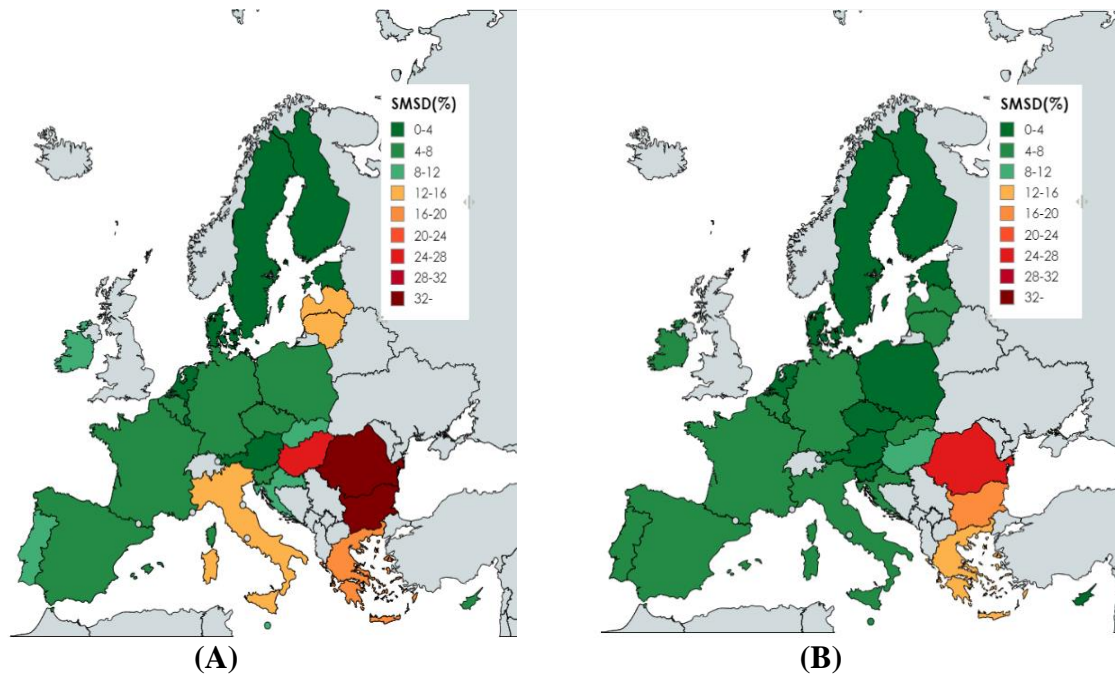


Figure 1. The SMSD rate for EU countries in 2015 (A) and 2022 (B)

Source: own compilation

In the next stage of our research, we built composite indicators that cover all thirteen MSD items. We used four methods: two with equal weights and two with different weights. Detailed information on the weights used in constructing the last two composite indicators is presented in Appendix 1. Next, we compared the country rankings obtained from the composite indicators and the SMSD rate. The results of the country ranks are shown in Table 1. The lower ranks mean higher MSD in a country.

Table 1. Ranks of countries concerning material and social deprivation

Country	2015 Ranks					2022 Ranks				
	SMS DR	z- scores	Min- max	B-V	C-Z	SMSD R	z- scores	Min- max	B-V	C-Z
Austria	24	24	24	24	24	22	21	21	21	21
Belgium	16	20	20	20	20	11	18	18	18	17
Bulgaria	1	1	1	1	1	2	2	2	2	2
Croatia	10	7	7	7	7	16	12	12	12	13
Cyprus	13	8	8	9	9	20	15	14	15	16
Czechia	20	17	17	17	17	24	24	24	25	24
Denmark	22	22	22	22	22	18	20	20	20	20
Estonia	21	18	18	19	18	17	17	17	17	18
Finland	27	25	25	25	25	26	23	23	23	23
France	17	19	19	18	19	6	9	9	8	8
Germany	18	21	21	21	21	9	11	11	11	11
Greece	4	4	4	4	4	3	3	3	3	3
Hungary	3	3	3	3	3	4	4	4	4	4
Ireland	9	12	12	12	12	11	13	13	13	12
Italy	7	10	10	10	10	15	14	15	14	14
Latvia	5	5	5	5	5	5	5	5	5	5
Lithuania	6	6	6	6	6	10	6	6	6	6
Luxembourg	25	26	26	26	26	25	27	27	27	27

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Malta	12	14	14	13	14	14	16	16	16	15
Netherlands	22	23	23	23	23	21	22	22	22	22
Poland	14	13	13	14	13	19	19	19	19	19
Portugal	8	9	9	8	8	13	8	8	9	9
Romania	2	2	2	2	2	1	1	1	1	1
Slovakia	10	11	11	11	11	8	10	10	10	10
Slovenia	19	16	16	16	16	27	26	26	26	26
Spain	15	15	15	15	15	6	7	7	7	7
Sweden	26	27	27	27	27	22	25	25	24	25

Note: SMSDR denotes ranking for severe material and social deprivation rate, min-max and z-scores mean rankings for composite indicators with equal weights using the min-max and the standardization procedures respectively. B-V and C-Z denote rankings for composite indicators with unequal weights using Betti-Verma and Cerioli-Zani methods respectively.

Source: *own compilation*

Analyzing the results in Table 1, one can see that the countries that improved their position greatly are Slovenia, the Czech Republic, Cyprus, Poland, and Italy while France, Germany, and Spain worsened their situation. An inevitable surprise may be the rise in the ranking of Italy from 7 to 15. In all rankings, in both 2015 and 2022, Bulgaria and Romania achieved the worst positions among EU countries while Luxembourg consistently remained in the top three. Following Bulgaria and Romania, another country with a problematic situation in terms of MSD turned out to be Hungary, although the country showed a remarkable drop in SMSD rates from 2015 to 2022 and switched its rank with Greece. Denmark is the only country where SMSD rates remained unchanged, but this did not prevent its ranking from dropping. In contrast, Slovenia was at the opposite pole with the lowest SMSD rate, overtaking the Finland in ranking in 2022. Luxembourg maintained its place as the third-best country in ranking.

Results in Table 2 prove the high coincidence degree of the rankings obtained. Spearman's rank correlation coefficients between the SMSD rate and composite indicators are higher than 0.94. Thus, we can conclude that the SMSD rate is a good representative of the multidimensional phenomenon of MSD. However, the obtained results do not permit a clear determination of which composite indicator produces a ranking closest to the one generated by the SMSD rate.

Table 2. Spearman's rank correlation coefficients between the SMSD rate and composite indicators

Years	Min-max	z-scores	B-V	C-Z
2015	0.9621	0.9621	0.9689	0.9652
2022	0.9440	0.9470	0.9519	0.9608

Source: *own compilation*

For most countries, the ranks based on the SMSD rate and composite indicators are the same or very similar. However, for several countries (see, for example, the rank of Cyprus in 2015 and 2022 and Finland in 2022), the ranks generated via composite indicators are lower. This means that composite indicators provide another piece of information about MSD than the SMSD rate. Thus, the composite indicator approach can be treated as a complement to the SMSD rate method. Considering all MSD items provides a more complete MSD picture than a single SMSD rate indicator.

It is worth noting that Spearman's rank correlation coefficients for all pairs of composite indicators are higher than 0.99. Therefore, it can be concluded that composite indicators



generate similar rankings of countries. This can be clearly seen in the rankings obtained via equal and unequal weights methods in Table 1.

When summarizing the results in the context of the research questions outlined in the introduction, firstly, we found that the country rankings generated by composite indicators differ from those generated by the SMSD rate but still, they are very similar with a few exceptions. As Spearman's rank coefficients for the SMSD rate and composite indicators ranking consistently exceed 0.94, the SMSD rate emerges as a reliable representative of material and social deprivation in a multidimensional approach. Secondly, there is no clear answer to say which method generates the rankings closest to the rankings generated by the SMSD rate, but we can say that either normalization or weighting methods can be assumed as complementary methods to the SMSD rate. Lastly, rankings by MSD are not constant over time. Slovenia improved its situation the most according to the ranks of the countries in MSD in 2015-2022. Nevertheless, France, Germany, and Spain worsened its situation. Although there is no precise definition of QoL, as we stated in the introduction, we evaluate the term multidimensionally within the scope of MSD. Almost all countries in the EU developed their situation in terms of QoL in 2015-2022, according to *Figure 1*. Bulgaria and Romania still had the highest SMSD rates and, thus, the lowest QoL level although they showed a significant drop from 2015 to 2022. Italy, The Czech Republic, Poland, and Cyprus showed significant development, and Slovenia is the best country in terms of QoL in the EU countries with its progress from 2015 to 2022. Following, Finland is the second-best country shared its place with Slovenia in 2022 according to SMSD rate.

We cannot directly compare our results with those obtained in other studies, as there is no research in the scope we analyze so far. However, it is worth mentioning that, to some extent, our findings coincide with those obtained for material deprivation. In particular, like Łuczak & Kalinowski (2020) and Ciacci & Traversa (2021), we find that Bulgaria and Romania have been among the countries most struggling with the problem of deprivation for many years. Our findings also corroborate Ciacci's & Traversa's (2021) results, indicating changes in the position of individual countries. Therefore, the situation regarding MSD should be continually monitored.

The most significant advantage of our paper is that, to the best of our knowledge, no one has compared the results of SMSD indicators with composite indicators constructed using four different approaches. This ensures the robustness of the rankings obtained through diverse methodologies. Comparing the results with different years enhances the reliability of the work both in rankings of countries and in the methods we have applied. Unraveling the determinants of SMSD can also be a focal point for future research. It is worth to examine the relationship between the occurrence of MSD and factors such as GDP per capita, unemployment rate, and the share of social protection expenditure in GDP.

## Conclusion

The importance and complexity of MSD make it a challenge to find appropriate measures of the current situation and progress of individual countries and their mutual comparison. Therefore, this study addresses this critical issue in the context of the solutions adopted in the EU and considers the EU adopted new indicator of 'severe material and social deprivation' which covers thirteen household- and individual-level items. The study uses four methods of building composite indicators. This allows for robust results and helps to avoid the most common defect in using composite indicators, i.e., the arbitrariness of the choice of normalization type and weights. The paper contributes evidence to the literature that the SMSD rate is a reasonably good representative of the multidimensional phenomenon of MSD. This is

a salient result in the narrower multidimensional poverty analysis and the broader QoL research, as both investigations incorporate MSD indicators. Moreover, it found that considered composite indicators generate similar ranks of countries. All indicators appoint Luxembourg as an absolute ‘winner’ in 2015 and 2022, as this country is one of the best three countries no matter which method is used. On the other hand, four countries, namely Bulgaria, Romania, Greece, and Hungary repeatedly appear as one of the worst countries in all analyzed years.

In general, results for 2015 show a divide between Scandinavian and West European countries with low levels of MSD and Central-Eastern European countries with high levels of MSD. However, the 2022 results did not confirm this division. Admittedly, the worst situation in terms of MSD is still in Central-Eastern European countries such as Romania and Bulgaria, but Greece joined the group in 2022 by swapping its rank with Hungary. Finally, it is worth mentioning that this study focuses exclusively on examining indicators of MSD using different methodologies, leaving the examination of the determinants of SMSD to future research.

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## Appendix 1

Table A1. The weights in Betti-Verma and Cerioli-Zani methods

Item	2015	2015	2022	2022
	B-V	C-Z	B-V	C-Z
warm home	0.0856	0.0755	0.0695	0.0614
food	0.0965	0.0845	0.0740	0.0731
unexpected expenses	0.0573	0.0546	0.0522	0.0435
holiday	0.0562	0.0421	0.0476	0.0564
arrears	0.0641	0.0862	0.1118	0.1023
car	0.0667	0.0851	0.0722	0.0697
furniture	0.0551	0.0468	0.0603	0.0649
internet	0.1028	0.0992	0.0840	0.0909
clothes	0.0674	0.0775	0.0785	0.0860
money	0.0757	0.0716	0.0648	0.0755
leisure	0.0744	0.0769	0.0589	0.0675
friends	0.0625	0.0728	0.0638	0.0800
shoes	0.1355	0.1271	0.1624	0.1287

Note: For explanations of MSD items, see the Introduction section

Source: *own compilation*