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Unveiling Multidimensional Poverty

Insights from the EU

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Abstract

The European Union has improved living standards, yet welfare disparities persist across regions, countries, and demographic groups. This paper uses data from European Union Statistics on Income and Living Conditions cross-sectional and longitudinal surveys and the at-risk-of-poverty or social exclusion framework to analyze recent temporal trends in absolute multidimensional poverty across the 27 countries in the European Union and its subregions. The analysis quantifies the extent, composition, and factors associated with the higher risks of multidimensional poverty across four countries (Bulgaria, Romania, Croatia, and Poland) and extends the at-risk-of-poverty or social exclusion framework to consider other dimensions of deprivations. The paper analyzes the extent of multidimensional poverty among the Roma population in Bulgaria and assesses the extent of chronic income poverty and chronic material deprivation among this group. The analysis reveals that some European Union member states present strikingly divergent trends in multidimensional poverty compared to the European Union average, and there have been different rates of progress across subregions. Results of the analysis of the four countries of interest indicate that although monetary poverty risks are comparable across these countries, there are notable variations in the incidence of nonmonetary indicators and the intensity of deprivations. However, the likelihood of being multidimensionally poor is conditioned by similar individual, socioeconomic, and family characteristics across countries. The Roma population in Bulgaria encounters more concurrent disadvantages compared to the broader population and is significantly more likely to be disproportionately represented among those experiencing chronic poverty and material deprivations. These findings underscore the urgent need for targeted policy interventions that tackle the most pressing needs of disadvantaged populations. Finally, the study proposes a set of potential policy interventions to address structural inequalities and improve the well-being of vulnerable populations.

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Unveiling Multidimensional Poverty: Insights from the EU*

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I. Introduction

The European Union boasts some of the highest living standards globally, yet significant welfare disparities persist among its regions and populations. Headcount income poverty at the $25 high-income country poverty line (in 2017 PPP) in the EU27 region has shown fluctuations over the long term, peaking at 38.2 percent in 2006 before gradually declining to 22.1 percent in 2021. Eastern and Central European countries have experienced a significantly faster decline than other European subregions.[1] More recently, the anchored at-risk-of-poverty (AROP) rate for the EU27 countries has decreased from 16.5 in 2019 to 13.8 percent in 2022. [2] Despite the progress witnessed across nations and regions in the last two decades, disparities in monetary poverty persist. In 2022, while some countries like Belgium and Czechia demonstrate relatively lower AROP rates (12.3 and 9.8 percent, respectively), others like Bulgaria and Estonia exhibit significantly higher rates (20.6 and 22.5 percent).[3] The COVID-19 and Ukraine crises have disproportionately impacted low-income populations, who experienced more severe income declines compared to middle-class and wealthier households, mostly due to the differentiated impacts on the labor market (Prasad et al., 2023; Michálek,2023).

Designing effective policies and interventions to address poverty and promote social inclusion presents numerous challenges. These challenges underscore the need for a thorough comprehension of poverty beyond monetary deprivations, including its persistent nature and assessment and design policies to tackle the inclusion of ethnic minority groups, for whom data availability is limited.

Poverty is a multi-dimensional phenomenon, including not only income but also other aspects of welfare; it is also important to understand the overlap between different dimensions of poverty. In 2022, approximately one-fifth of the European Union (EU) was at risk of poverty or social exclusion (AROPE)[4]. When looking at individual countries within the EU, Romania and Bulgaria experienced the highest poverty and social exclusion rates, reaching 34.4% and 32.2%, respectively, while Czechia reported the lowest at 11.8%. The elderly population (aged 65 to 74) in these countries was particularly vulnerable to poverty and social exclusion, with rates of 33.7% and 37.8 %, respectively. Children also tend to experience a higher risk, with about 41.5% and 33.9% of Romanian and Bulgarian children affected by poverty and social exclusion. There are significant urban-rural differences: in both countries, over 40 percent of the rural population is considered socioeconomically deprived, according to AROPE, compared to less than one-fourth of the urban population.[5] Though multidimensional poverty indices are useful, as they combine information on several deprivations of well-being measured at the household level in one scalar number, it is also important to understand the extent of overlap between them (Ferreira and Lugo, 2012; Bradshaw and Finch, 2003). Moreover, the monetary welfare dimension of the AROPE indicator has a relative nature. To monitor progress

[1] Source: Own Estimates based on the European Union Statistics on Income and Living Conditions (EU-SILC) for all countries in EU27, except Germany, for which microdata is not available. The year refers to income reference year 2022 and survey year 2023. Eastern and Central EU countries are Bulgaria, Czechia, Croatia, Hungary, Poland, Romania, the Slovak Republic and Slovenia.

[2] An individual is at risk of poverty if he/she has an equivalized disposable income (after social transfers) below 60 percent of the national median equivalized disposable income after social transfers. To track poverty changes over time, the poverty line is fixed/anchored in the year 2019. Source: Eurostat, 2024

[3] Source: Eurostat, 2024

[4] The AROPE is the main indicator to monitor the EU 2030 target on poverty and social exclusion. An individual is AROPE if she is deprived in at least one of these dimensions: income poverty, severe material deprivation, and low work intensity, as explained in more detail later in this paper.

[5] Source: Eurostat, 2024; The year refers to the survey year 2022. No more recent estimate is available for EU27.

toward poverty eradication in the EU, an absolute measure is recommended to track changes over time against a fixed benchmark.

Furthermore, distinguishing between transient and persistent poverty is crucial, as it allows for a policy focus on preventing long-lasting poverty. Though cross-sectional analysis of poverty is extremely important, moving beyond isolated snapshots of monetary deprivation in a single period is critical. In 2023, persistent at-risk-of-poverty rates[6] varied significantly across the EU. Croatia, Bulgaria, Estonia, and Romania reported rates between 14% and 20%, highlighting entrenched challenges, while Hungary and Czechia had rates below 4.0%. The persistence of poverty is a complex issue that requires a multifaceted approach.

Finally, there are challenges to properly identifying some at-risk-of-poverty groups in the EU and designing policies to properly address poverty and social exclusion, particularly ethnic minority groups such as the Roma. While official household surveys in European countries show that several identifiable groups face higher rates of poverty, chronic poverty, or at-risk poverty and social exclusion**,** in most EU countries, there are no official measures of poverty among the Roma population, as they cannot be accurately identified in household surveys. Ethnicity is not broadly collected, and if included in the survey instruments, they tend to be undercounted in censuses and under-sampled in household surveys, so poverty cannot be reliably measured (Annex 1).[7] Official data from countries with available ethnic identifiers, such as Bulgaria, indicates extremely high monetary and multidimensional poverty rates among this group. However, comprehensive estimates for this group are not universally available across all EU countries. The absence of data on poverty within this group may result in a lack of tailored policy responses, as policymakers may not be aware of the extent of their poverty, whether they are persistently poor or move in and out of poverty frequently, or the overlapping deprivations they face.

Unofficial data on Roma populations collected by the Fundamental Rights Agency (FRA) shows large deprivations in several areas compared to the general population, which tend to persist over time. Despite a well-defined strategy, the EU Roma Strategic Framework for equality, inclusion, and participation, and the allocation of EU funds for Roma inclusion through the European Structural and Investment Funds[8], progress in enhancing development outcomes has been sluggish. Although recent data from the 2021 FRA Roma surveys in the EU demonstrate some improvement in recent years, the Roma community continues to grapple with limited access to essential services (such as education, health, and adequate housing conditions), enduring precarious living conditions, including in isolated communities.[9] In health, there is a significant life expectancy gap between Roma populations and the general European population, with estimates ranging from 5 to 20 years less. Adequate housing conditions are scarce. In housing, Roma communities often endure substandard living conditions, face challenges in

[6] The persistent at-risk-of-poverty rate shows the percentage of the population living in households where the equivalized disposable income was below the at-risk-of-poverty threshold for the current year and at least two of the preceding three years. Source: Eurostat, 2024

[7] Other vulnerable groups such as disabled individuals, sexual minorities, and migrants are also not covered in the EU-SILC surveys.

[8] Source: EU funding for Roma equality, inclusion and participation

[9] For example, enrollment rates for early childhood education (children aged 3 up to the primary compulsory school age) are extremely low and dropped from 44 to 42 percent between 2016 and 2021 in the EU. The data also underscores a significant gap in educational attainment for 20-to 24-year-old Roma individuals, with only 27% having reached at least upper secondary education on average across all EU countries, with substantial country variations. The new EU Roma framework aims to reduce this gap by a third by 2030 and highlights the ongoing issue of school segregation among Roma children aged 6 to 15.

securing new accommodations, and experience a higher rate of evictions compared to the general population, highlighting the housing-related challenges. Moreover, Roma households are often affected by spatial marginalization: Roma communities frequently live in areas deprived of social services and far from job opportunities.[10]

Against this background, the aim of this working paper is threefold.

First, it constructs a measure of absolute multidimensional poverty for the EU to analyze recent temporal trends at regional, subregional, and country levels. We construct a measure of anchored AROPE for the 27 EU countries (except Germany) to monitor changes over time, using data from the 2021 and 2022 EU-SILC cross-sectional surveys,[11] and following the at-risk-of-poverty or social exclusion (AROPE) framework. The AROP indicator is a measure of income inequality, as the poverty threshold, set at 60% of the national equalized median disposable income (in national currency), can vary from year to year based on changes in the overall income level and its distribution. Therefore, to properly analyze changes in absolute multidimensional poverty over time, a measure of anchored AROP capturing changes in monetary living standards should be used as part of AROPE.

Second, it quantifies the extent and composition of multidimensional poverty across four EU countries (Bulgaria, Romania, Croatia, and Poland)[12]; it also identifies factors associated with higher risks of poverty or social exclusion and vulnerable groups and extends the AROPE framework to incorporate additional dimensions of deprivations. The multidimensional approach extends beyond a narrow focus on income to encompass broader dimensions of household and individual deprivation. This analysis aims to provide an updated picture of multidimensional poverty in four EU countries. The analysis is cross-sectional in nature and relies on the more recent 2022 EU-SILC cross-sectional wave available for these countries. The analysis includes estimates of the incidence of multidimensional poverty and the degree of overlapping deprivations, delves into the underlying factors contributing to higher risks of multidimensional poverty, and identifies at-risk population groups to inform targeted policy interventions tailored to different European contexts. Finally, it extends the AROPE measure to include key additional dimensions (access to education and health) and a broader measure of social and material deprivations, which includes some aspects of living conditions (i.e., overcrowding).

Finally, it conducts a further analysis of multidimensional poverty among the Roma population in Bulgaria, the only country for which disaggregated data by ethnicity is available; this also includes longitudinal analysis to assess the extent of chronic income poverty and chronic

[10] Source: 2021 FRA Survey. Roma in 10 European Countries Report.

[11] Longer temporal trends are not possible due to the methodological changes in the AROPE indicator, as explained in more detail in Section II.

[12] We focus on the latest countries to join the European Union: Croatia, which became a member on July 1, 2013, and Bulgaria and Romania, which both joined on January 1, 2007. Poland joined the European Union on May 1, 2004, as part of a significant enlargement that included nine other countries. Despite sharing some common characteristics, these countries have made uneven progress in social and economic dimensions. Bulgaria and Romania still face significantly high rates of poverty, social exclusion, and inequality, whereas Croatia and Poland have made substantial improvements.

severe material deprivation[13] among this group.[14] Given the importance of distinguishing between static and chronic disadvantages, we use the EU-SILC rotating panel in Bulgaria to identify and profile the chronic monetary poor. Given the availability of ethnic identifiers, we test whether the Roma population is more likely to be overrepresented among the chronic poor and identify whether they are more likely to face overlapping deprivations than the general population. This analysis aims to shed light on these marginalized communities' complex challenges and identify potential interventions to address their multifaceted needs.

The first two parts of our study contribute to the existing literature on multidimensional poverty within the EU. Alkire et al. (2014) employ the Alkire Foster (AF) methodology (Alkire and Foster, 2011) to introduce a set of experimental indices aimed at measuring multidimensional poverty in the EU, leveraging cross-sectional data from the (EUSILC) for 2006-2012. Notably, the study adapts the at-risk of Poverty or Social Exclusion (AROPE) indicator, enhancing its applicability within the EU context under the EU2020 framework. This index encompasses various dimensions beyond income, including employment, material deprivation, education, environment, and health. This work serves as a cornerstone for understanding multidimensional poverty in the region and is particularly relevant to our analysis. Weziak-Bialowolska and Dijkstra (2014) adopted the UN-Multidimensional Poverty Index (MPI) framework to construct a regional poverty index at the sub-national level in the European Union, using EU-SILC data spanning from 2005 to 2011. Their index considers three dimensions: living standards, education, and health. Deutsch et al. (2015) analyze cross-country variations in material deprivation in the 27 EU countries using latent trait analysis. Buligescu (2019) examines multidimensional poverty through the lens of various deprivation dimensions, focusing only on Romania and using data from the 2016 Household Budget Survey (HBS). Notably, the research diverges from traditional metrics like AROPE or those endorsed by the Oxford Poverty and Human Development Initiative (OPHDI). Instead, it bases its analysis on the European Union Chapter of the Human Rights Charter, offering a different perspective on multidimensional poverty, but it is not directly comparable to other methodologies.

The last part of our study contributes to the literature on chronic poverty and material deprivations in Europe, and the literature on poverty and deprivations among the Roma population. Whelan, Layte, and Maitre (2002) use the European Community Household Panel (ECHP) to explore the relationship between persistent income poverty and multiple deprivation in the EU. The study employs a weighted measure that accounts for the prevalence of each deprivation item across different countries and focuses on the intersection of persistent income poverty and deprivation, encompassing various aspects such as basic and secondary lifestyle deprivation, housing facilities, deterioration, and environmental issues. Biewen (2014) focuses on monetary poverty persistence and dynamics, primarily from an income-based perspective rather than considering multidimensional aspects. Papadopoulos (2016) examines the intersection between chronic material deprivation and long-term income poverty, using EUSILC data for the period 2005-2008, offering insights into persistent deprivation but without explicitly addressing multidimensional poverty. Suppa (2023) uses EU-SILC panel data from 2016–2020 and the Alkire Foster approach to explore whether deprivations couple or decouple over time, estimating differences in deprivation transition probabilities between multidimensionally poor

[13] Analyzing the chronic nature of AROPE is not possible, given that longitudinal EU-SILC microdata does not have the activity calendar; therefore, low work intensity cannot be estimated; we limit our analysis to the dimensions of AROPE that can be analyzed: chronic AROP and chronic material and social deprivation.

[14] This country is selected because ethnic identifiers are available in the household survey, facilitating a more detailed analysis of the Roma population.

and non-poor people. Dotto et al. (2017) use the longitudinal component of the EU-Statistics survey on income and living conditions and develop a dynamic latent class model for evaluating material deprivation (without resorting to arbitrarily specified thresholds) over the period 2010-2013 in Greece, Italy, and the UK. While these studies contribute to understanding aspects of chronic poverty and material deprivations within Europe, none of these studies have looked at the extent of chronic poverty or material deprivations among the Roma population. Furthermore, they either focus on specific dimensions such as material deprivation or analyze persistence primarily from an income perspective, with few directly addressing chronic multidimensional poverty.

The paper is organized as follows. Section II introduces the conceptual framework. Section III presents the data and empirical strategy. Section IV presents empirical results, including an analysis of the EU trends in absolute multidimensional poverty, the extent, composition, and mechanisms behind multidimensional poverty in four EU countries, and an analysis of multidimensional poverty among the Roma in Bulgaria, which also includes an assessment of chronic income poverty and material deprivations among this group. Section V concludes and provides policy implications.

II. Conceptual Framework

Conventional poverty measures have typically been centered around income or expenditure, which in most countries is based on a minimal threshold necessary to afford a basic basket of essential goods and services. However, these monetary measures may only partially encompass the various dimensions of well-being. Additionally, while monetary poverty strongly correlates with deprivations in other domains, this correlation is far from perfect (World Bank (2022); Evans et al., 2024). Multidimensional poverty metrics have emerged to bridge this gap and have gained official recognition within the United Nations' 2030 Agenda and its Sustainable Development Goals (SDGs). Specifically, they are embodied in "SDG 1.2.2" which assesses the proportion of people of all ages, both men and women, living in poverty across all dimensions as defined by each nation's unique criteria.[15] The monetary approach depends on information collected from household surveys that track household spending and incomes.

One approach to address the multidimensional aspect of poverty is to evaluate the extent of deprivation within each dimension separately, thereby constructing a comprehensive set of indicators. This approach yields a set of poverty indicators that not only includes the traditional income poverty rate but also encompasses deprivations in various other dimensions of well-being. These may include statistics on undernourishment, illiteracy, and the lack of access to improved sanitation. This approach offers valuable insights across multiple dimensions of poverty but often falls short of revealing the degree of overlap between different deprivations or the joint distribution of disadvantages. The ambiguity arises because these indicators alone cannot distinguish between scenarios where no one experiences multiple deprivations or scenarios where a large share of the population experiences all deprivations concurrently.

A different approach goes further and constructs multidimensional poverty measures, with the advantage of allowing the identification of multiple overlapping deprivations. While the

[15] SDG Indicator 1.2.2 (National Multidimensional Poverty) distinguishes itself from other indicators within the Global SDG Indicator Framework by not imposing a universal methodology. Instead, it empowers each country to establish its national multidimensional poverty measure. This approach acknowledges the diversity of circumstances and priorities across nations, allowing for a more nuanced and context-specific assessment of poverty and well-being.

multiple-indicator approach offers valuable insights across multiple dimensions of poverty, it often falls short of revealing the degree of overlap between different deprivations. The ambiguity arises because these indicators alone cannot distinguish between scenarios where no one experiences multiple deprivations and scenarios where a large share of the population experiences all three deprivations concurrently. Hence, a more nuanced and precise approach is required. To determine the percentage of those classified as multidimensionally poor, a rule must identify individuals facing multidimensional poverty, i.e., those deprived in all dimensions or experiencing at least one deprivation among multiple dimensions. Papadopolous (2016) noted that this approach offers valuable insights into social exclusion dynamics. By identifying overlapping deprivations, policymakers, and service providers can tailor interventions to address the most pressing needs of disadvantaged populations. This ensures that social services are designed to significantly improve household welfare among these communities.

Multidimensional poverty frameworks are critical for poverty and social inclusion reduction policies, including assessing gaps in public service provision, as they can help understand whether individuals or communities are simultaneously experiencing shortfalls in multiple development outcomes. This analysis can help identify if certain demographic groups are more affected by some poverty dimensions than others. Identifying these intersections of deprivation is crucial for targeted interventions and informing the assessment of public service delivery among these vulnerable groups. The analysis can be used to guide sectoral interventions, such as social services, health, educational, employment, or housing interventions. This evidence serves as a foundation for progress in monitoring those at risk of poverty and social exclusion, enhancing comprehension of the distributional consequences of programs and policies, and informing policies and programs to improve access to public services among these communities.

In the EU, a central measure currently used for monitoring and evaluating the progress of the Europe 2030 Strategy on poverty and social exclusion and the European Pillar of Social Rights, established by EU institutions in November 2017, is the "At Risk of Poverty or Social Exclusion" (AROPE) indicator.[16] AROPE encompasses three distinct dimensions or indicators, measuring whether an individual falls into one of these categories: being at risk of monetary poverty, residing in households with very low work intensity, or experiencing severe material and social deprivation. In essence, AROPE defines a person as being at risk of poverty or social exclusion if they encounter deprivation in at least one of these areas. This measure was also used to monitor the previous EU 2020 strategy. AROPE has also gained prominence as a critical indicator for Goal 1 of the Sustainable Development Goals (SDGs) in the 2030 Agenda for Sustainable Development.

In 2021, the AROPE indicator underwent modifications to align with the new EU 2030 target, namely reducing the number of individuals vulnerable to poverty or social exclusion by a minimum of 15 million by 2030, including at least 5 million children. These revisions enhance

[16] Since 2010, the European Union has pursued an economic strategy with a clear target for 2020: To reduce the number of people at risk of poverty by 20 million. To assess progress towards this goal, the European Union uses AROPE. Under the EU2030 strategy, the goal is to reduce poverty and social exclusion by at least 15 million people by 2030, including 5 million children. While AROP is a relative indicator, severe material and social deprivation (SMSD) is an absolute indicator as it is based on a common basket of goods and services that are relatively independent from each other, and fix over time. The SMSD rates offer a consistent, standardized measure applied across all Member States, reflecting a shared set of basic material and social needs. These rates establish a common, needs-based, absolute threshold for EU-wide poverty measurement and analysis (Menyhért et al.,2021).

the accuracy of measuring deprivation, broaden the scope of the aspects of living conditions and societal needs by incorporating an updated item list, and provide a more comprehensive assessment of social exclusion for those within the working age bracket, extending from 18 to 64 instead of the previous 18 to 59 (Table 1).[17]

The severe material and social deprivation rate (SMSD), adopted by the Indicators' Sub-Group (ISG) of the Social Protection Committee (SPC), distinguishes between individuals who cannot afford a particular good, service, or social activity. It is defined as the proportion of the population experiencing an enforced lack of at least 7 of 13 deprivation items (7 related to the household and 6 related to the individual) (Table 2).

Table 1. Changes in AROPE definition to meet EU objectives by 2020 vs. 2030

Component	Europe 2020	Europe 2030
At risk of poverty rate (AROP)	Percentage of persons in the total population who are at-risk-of-poverty	Percentage of persons in the total population who are at-risk-of-poverty
Low work intensity indicator (LWI)	People aged 0-59 years living in households where the adults (those aged 18-59, but excluding students aged 18-24) worked a working time equal to or less than 20 % of their total combined work-time potential during the previous year	People from 0-64 years living in households where the adults (those aged 18-64, but excluding students aged 18-24 and people who are retired according to their self-defined current economic status or who receive any pension (except survivors pension), as well as people in the age bracket 60-64 who are inactive and living in a household where the primary income is pensions) worked a working time equal or less than 20% of their total combined work-time potential during the previous year
Severe material (and social) deprivation rate (SMSD)	Severe material deprivation rate (SMD): Proportion of the population that cannot afford (rather than the choice not to do so) at least 4 out of 9[18] predefined material items considered by most people to be desirable or even necessary to lead an adequate life	Severe material and social deprivation rate (SMSD): Proportion of the population experiencing an enforced lack of at least 7 out of 13 deprivation items (6 related to the individual and 7 related to the household)

Source: Eurostat
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_(AROPE)

[17] The changes include: 1) Refining the criteria for severe material deprivation to establish a novel severe material and social deprivation rate, expressed as a percentage of the total population lacking a minimum of 7 items of 13 material and social deprivation components, and 2) Introducing the (quasi)-jobless household indicator, defined as "individuals aged 0-64 residing in households where adults (those aged 18-64, excluding students aged 18-24 and individuals self-identified as retired or recipients of any pension, except survivor's pension) worked for a duration equal to or less than 20% of their total potential work time during the preceding year."

[18] The indicator measures the percentage of the population that cannot afford at least four of the following nine items: 1) pay their rent, mortgage or utility bills; 2) keep their home adequately warm; 3) face unexpected expenses; 4) eat meat or proteins regularly; 5) go on holiday; 6) a television set; 7) a washing machine; 8) a car; 9) a telephone.

Table 2. Deprivations included in the severe material and social deprivation rate (SMSD), Europe 2030

	Deprivations at the Household Level	Deprivations at the Individual Level
Severe material and social deprivation rate (SMSD)	1. Capacity to face unexpected expenses 2. Capacity to afford to pay for a one-week annual holiday away from home 3. Capacity to be confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase installments, or other loan payments) 4. Capacity to afford a meal with meat, chicken, fish, or vegetarian equivalent every second day 5. Ability to keep home adequately warm 6. Have access to a car/van for personal use 7. Replacing worn-out furniture	1. Having an internet connection 2. Replacing worn-out clothes with some new ones 3. Having two pairs of properly fitting shoes (including a pair of all-weather shoes) 4. Spending a small amount of money each week on him/herself 5. Having regular leisure activities 6. Getting together with friends/family for a drink/meal at least once a month

Source: Eurostat
https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_(AROPE)

Other multidimensional poverty indicators are commonly used in other countries/regions. These include the Unmet Basic Needs, traditionally used in Latin American countries, the UNDP-OPHI Multidimensional Poverty Index (MPI) developed by the Alkire-Foster Approach to Multidimensional Poverty, and the Global Multidimensional Poverty Measures (MPM) developed by the World Bank.[19] These measures might include different dimensions of deprivations and/or indicators not included in the AROPE, including education, health, infrastructure, etc. (see Annex 2 for differences in dimensions and indicators). The World Bank MPM is made publicly available for EU countries, and some experimental multidimensional indices following UNDP-OPHI have also been published, as mentioned before. Recent evidence proposes a conceptual framework for social exclusion and a multidimensional measure (Cuesta et al. 2024).

This paper primarily follows the AROPE 2030 framework, which is the primary framework for analyzing multiple deprivations among vulnerable groups, given its prominence as the standard measure for policy formulation and monitoring within the EU. The AROPE framework has several advantages among the multidimensional poverty measures. First, AROPE is situated within the extensive body of research on multidimensional poverty measurement,[20] and adheres to globally recognized criteria when crafting indicators and dimensions to assess household well-being in the EU. Moreover, the material deprivation index, which leverages a methodology pioneered in 1999 and further refined in 2012[21], generates a deprivation measure for the EU that is appropriate and exhibits validity, reliability, and additivity. Second, the AROPE indicators can be constructed with microdata from the European Union Statistics on Income and Living

[19] For more details, see World Bank (2018a).
[20] See World Bank, UNDP & UNICEF (2021).
[21] See Guio et al. (2016).

Conditions (EU-SILC), available for the 27 EU countries, and can be disaggregated for vulnerable groups that can be identified in the household surveys.

Despite the advantages, AROPE has faced scrutiny as a multidimensional poverty measure, with critics highlighting various shortcomings. For example, the AROPE framework is still limited to economic dimensions (employment, income, and material deprivation) without considering other dimensions that were already included in other multidimensional poverty measurements. Some indicators of access to basic services and affordability, or education, which are highly policy-relevant, are not included in this framework. Furthermore, it fails to acknowledge that the concurrence of several indicators can lead to the accumulation of difficulties and consequently result in more severe situations of social exclusion.[22] From this perspective, an individual is labeled as at risk of poverty or social exclusion regardless of the number or extent of dimensions in which they fall short. The approach also disregards the depth of poverty, as it is not possible to determine the intensity of shortfall from each threshold and prioritize those below the poverty line (see, e.g., Barcena-Martín et al., 2020**;** Nolan and Whelan, 2011a, 2011b; Copeland and Daly, 2012; Maître et al., 2013; Fusco, 2015).

The specific target population of this study includes primarily those at high risk of poverty or social exclusion in recent years, measured with the AROPE framework, and the chronically poor and materially and socially deprived in Bulgaria, with a focus on Roma. This means we focus on the multidimensionally poor (a snapshot of who is deprived in a given year). Additional analysis of chronic poverty and chronic material and social deprivation (capturing who is consistently monetary poor/consistently deprived over time) is also undertaken in Bulgaria. Within this group, attention will be given to the Roma to understand whether they are overrepresented among them.

III. Data and Empirical Strategy

To analyze multiple deprivations and at-risk-of-poverty or social Exclusion (AROPE) among vulnerable groups in the EU (excluding the Roma), we rely on cross-sectional and longitudinal data from the European Union Statistics on Income and Living Conditions (EU-SILC).

The EU-SILC is a comprehensive survey conducted in 27 European Union member states as well as Iceland, Norway and Switzerland. The EU-SILC is composed of national probability sample surveys of individuals 16 years and older and is conducted annually. The target population comprises private households. It collects data on income, poverty, social exclusion, and living conditions of households and individuals. EU-SILC offers two primary types of data: cross-sectional data, which captures information over a specific time frame and includes variables related to income, poverty, social exclusion, and living conditions, and longitudinal data, which tracks individual-level changes over a four-year period. Social exclusion and housing conditions data are predominantly gathered at the household level, while labor, education, and health information is obtained from individuals aged 16 and above. Detailed income components are also primarily collected from individuals within the survey. The EU-SILC relies on a stratified multi-stage (two-stage stratified) sampling with a primary sampling unit (Census

[22] AROPE identifies individuals as multidimensionally poor if they meet any of the thresholds (union criteria), meaning that a deficiency in one dimension is enough to classify them as at risk of poverty or social exclusion.

enumeration units) and a secondary sampling unit (dwellings).[23] There is stratification in the first stage of sampling, based on 88 strata (urban and rural areas plus counties) (ibid).

The EU-SILC survey instrument is structured to gather the AROPE indicators at both household and individual levels, enabling comprehensive AROPE monitoring across the 27 EU countries. While this dataset enables the assessment of multiple deprivations among several vulnerable groups, it does not allow the assessment of deprivations among the Roma population due to the unavailability of ethnicity information. Very few EU countries currently have ethnic identifiers in the official household surveys. In addition, they suffer from significant data challenges (see Annex 1), underscoring the need for careful consideration when interpreting and utilizing ethnic data collected as part of the official household surveys.

To monitor AROPE changes over time, we build a measure of absolute multidimensional poverty ("anchored AROPE"). The at-risk-of-poverty measures income inequalities rather than direct poverty, as the poverty threshold varies with income distribution**.** Therefore, we anchored the poverty line to the year 2019 to track absolute income poverty and deflate the monetary welfare aggregates with the HCPI (Harmonized Consumer Price Index). This adjustment in the monetary component helps to ensure that the poverty threshold remains fixed or anchored and consistent across different years, allowing for more accurate comparisons of poverty rates over time.[24] Together with material and social deprivation[25] (the absolute component of the AROPE) and low work intensity, which captures exclusion from the labor market, they constitute the anchored AROPE, an absolute measure of multidimensional poverty.[26]

To overcome some of the AROPE shortcomings mentioned in section II, we looked at the overlapping of deprivations and expanded the AROPE framework. Given the potential sensitivity of the measure to the dimensions added, we run some sensitivity analysis, including different combinations of individual deprivations. We also construct a modified version of the AROPE (AROPE +) while ensuring alignment with the framework's essence[27]. The measure of AROPE + extends the AROPE indicator in two ways. First, it extends the material and social deprivation indicator by incorporating an additional deprivation at the household level to account for housing conditions; we use a variable that indicates if the person lives in an overcrowded dwelling[28], that is, if the average number of people per room available to the household is greater than two, following the definition of Weziak-Bialowolska and Dijkstra

[23] Source: Gesis, 2021

[24] Other studies have emphasized the need to measure and monitor an absolute measure of poverty in the EU (Menyhért et al.,2021), but have focused more on constructing absolute measures of monetary poverty, rather than on constructing an absolute measure of multidimensional poverty.

[25] We follow Eurostat's criteria for the construction of material and social deprivation for children. Specifically, the same set of 13 items (see Table 2) and thresholds are used for adults and children. However, because individual items are collected for people aged 16 or above, a child is considered deprived in an item if at least half of the adults in the household lack that item. As a result, adult items carry less weight in computing children's deprivation. Additionally, for a child to be considered materially and socially deprived at least three of the deprivations must be household-level items out of the seven household deprivation items included in the list.

[26] Eurostat does not publish a measure of anchored AROPE, only a measure of anchored AROP.

[27] As a result, we did not implement a new approach for measuring the weights of the indicators; rather, we assumed equal weighting. Moreover, equal weights are easy to communicate. Using equal weights across dimensions suggests that all domains are considered equally important. This approach ensures that no single dimension is given more importance in the analysis.

[28] While we add this variable to the list of household-level deprivations, we do not modify the number of deprivations (threshold) required to be materially and socially deprived.

(2014)[29]. Second, it incorporates two additional dimensions: education and health[30], similar to Alkire and Apablaza (2016) and Weziak-Bialowolska and Dijkstra (2014). An individual is educationally deprived if at least one adult (18+) in the household has only attained primary education (or less).[31, 32] An individual is deprived in the health dimension if at least one adult (16+) in the household has unmet needs for medical examination or treatment during the last twelve months.[33]

For the Roma-specific analysis, AROPE indicators are mostly unavailable among ethnic population subgroups (with the exception of Bulgaria) when using the EU-SILC survey instrument. While other countries may have available ethnic identifiers in other official surveys (such as Household Budget Surveys), the indicators that conform with the AROPE cannot be constructed with other survey instruments.

To understand factors associated with multidimensional poverty, a series of Probit models with different specifications were selected. These were chosen as a suitable statistical approach for modeling dependent variables characterized by dichotomous outcomes, such as the presence or absence of AROPE (at risk of poverty or social exclusion), low work intensity, and severe material and social deprivation. The model includes household and individual-level characteristics. This choice is grounded in its ability to estimate the probability of an event occurring, making it particularly well-suited for binary outcomes. The models were run with different sets of covariates and 2021 and 2022 data to capture the stability of the relationship between a set of explanatory variables and the likelihood of experiencing these specific forms of deprivation and identify any emerging trends or shifts in socio-economic dynamics and the robustness of the results to the specification. We report marginal effects, which allows for a clearer interpretation of the model results by quantifying the change in the probability of the outcome variable associated with a one-unit change in the independent variables. This facilitates a deeper understanding of the factors associated with the likelihood of being at risk of poverty or social exclusion, facing low work intensity, or experiencing severe material and social deprivation, thereby informing targeted policy interventions aimed at alleviating these socio-economic challenges. Annex 4 describes the specifications of the regressions performed.

To identify at-risk groups, we compare unconditional and conditional AROPE means. In our modeling approach, we incorporate several vulnerable groups[34] as covariates to assess whether they continue to face a higher probability of experiencing poverty, even when controlling for other observable characteristics. By including these covariates in the probit model, we aim to examine the unique contribution of each vulnerable group to the likelihood of being at risk of poverty or social exclusion, facing low work intensity, or experiencing severe material and social deprivation. This allows us to identify persistent disparities in socio-

[29] We do not include other services and infrastructure variables (such as quality of the dwelling or sanitation facilities) typically included in the EU SILC because these variables are not available in the 2021 and 2022 surveys.

[30] We do not include self-reported environmental variables (noise from the neighborhood, pollution, crime) because these are not available in the 2021 and 2022 surveys. They were collected annually until 2020 and then again in 2023.

[31] We use primary education as the deprivation threshold because the majority of the population has secondary education or above. Thise with other studies on Europe, including those of OPHI.

[32] We could not construct a measure of educational deprivation among children because the SILC survey is not designed to collect educational attainment data for children. Therefore, enrollment rates may vary significantly from administrative data. Thus, we rely on information on the educational level of adults (Alkire and Santos, 2014).

[33] In the EU-SILC, the question of unmet needs for medical attention or treatment is only asked for individuals aged 16 and over. Given this, for the educational and health variables we use the same age cutoffs used by Eurostat.

[34] These vulnerable households were selected following previous evidence on poverty profiles and households vulnerable to shocks in these countries (Prasad et al., 2023; World Bank, 2017, 2018b, 2021, 2023a, 2023b).

economic outcomes among different demographic segments, shedding light on the underlying structural inequalities that contribute to poverty and social exclusion. Finally, geographic identifiers (urban/rural and NUTS2 identifiers[35]) were also added to shed light on subnational disparities.

To analyze poverty and multiple deprivations among the Roma population, we rely on the latest national SILC from Bulgaria; analysis for other countries is not possible due to a lack of ethnically disaggregated data in the EU-SILC and the unavailability of AROPE indicators in other household surveys. In the context of Bulgaria, the examination of multiple deprivations within the Roma population will leverage the comprehensive AROPE framework and the 2021 cross-section and longitudinal SILC; in Romania, the other country with available ethnic identifiers in the HBS, construction of AROPE was not feasible, due to large differences in survey design.[36] Construction of AROPE using non-official periodic targeted surveys to include hard-to-reach groups, such as the latest 2021 FRA household-level data, was also not feasible, despite the potential for harmonized comparative analysis of ethnic disparities across several EU countries. These surveys also suffer from some limitations.[37].

The analysis of chronic deprivations in Bulgaria leverages the longitudinal component of the EU-SILC, allowing for a comprehensive understanding of persistent socio-economic challenges over time. Using longitudinal data from EU-SILC, it is possible to identify and analyze households and individuals experiencing persistent severe material and social deprivation over several years, similar to assessing persistent poverty risk. The EU-SILC panel data operates on a rotating panel system, where each year, a sixth of the initial sample is replaced with a new subset, ensuring the complete renewal of the sample every six years.[38] This approach mitigates the issue of attrition commonly observed in full panel datasets over time. However, the six-year timeframe may limit the scope of dynamic analyses regarding income or multidimensional deprivation, particularly for capturing long-term trends. Each subgroup within the panel is designed to be representative of the entire population for a specific year, facilitating cross-sectional estimates and comparisons across different time points. The data is distributed in two variants: cross-sectional, which includes all six subsamples from different rotational groups for a given year, and longitudinal, which comprises observations from rotational groups previously observed. The longitudinal component enables analyses of poverty persistence over time, though limitations arise when dealing with newly introduced rotational groups, as they may not provide historical data for

[35] The EUSILC does not have NUTS3 identifiers.

[36] For example, some dimensions of multiple deprivations cannot be measured with the HBS, as there is no deprivation module as in SILC.

[37] The 2021 FRA Roma surveys include the following eight EU Member States (Croatia, Czechia, Greece, Hungary, Italy, Portugal, Romania, and Spain) and addition to non-EU member states (North Macedonia and Serbia). The countries covered in these surveys, together with Bulgaria and the Slovak Republic, cover 87 % of the estimated Roma population in the EU or 53 % of the estimated Roma population in Europe. The microdata is not yet released. However, while these surveys can provide estimates for ethnic populations, these estimates are generally not comparable to official household surveys due to methodological differences related to sampling methodology and questionnaire design. Additionally, these surveys do not contain a proper income or consumption module to allow measurement of monetary poverty. Therefore, they cannot produce official national estimates for monitoring outcomes.

[38] Following IESS regulation, starting from 2021 onwards, Eurostat recommends using at least a four-year rotational design. Bulgaria, in addition to other countries (Belgium, Ireland, Italy, Netherlands, and Sweden) are using a six-year rotation design.

comparison. Ethnic identifiers were merged from the national SILC into the EU-SILC using unique ID household identifiers.[39]

To analyze chronic deprivations, we focus on the two components of the AROPE measure that can be estimated and traced over time: persistent at risk of poverty and persistent severe material and social deprivation. We follow the definitions of Eurostat, so that a person is at a persistent risk of poverty (or endures persistent material and social deprivation) if the individual is at risk of poverty (or endures persistent social material deprivation) in the current year and in at least two of the three preceding years.

IV. Assessing Multidimensional Poverty in the EU

Is multidimensional poverty stagnant? Are there diverging trends across the EU countries and subregions?

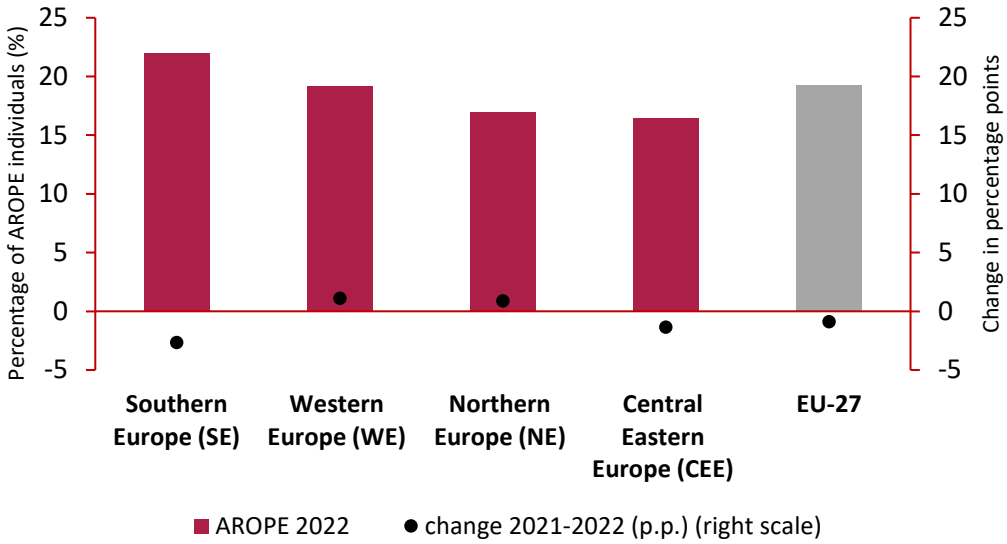
While the European Union-27 (EU-27) witnessed a marginal decrease in absolute multidimensional poverty recently, different rates of progress are observed across EU subregions. The at-risk of poverty or social Exclusion AROPE rate (non-anchored) for EU27 (including Germany) has been stagnant since 2018. Our measure of absolute multidimensional poverty shows similar trends. From 2021 to 2022, the anchored (AROPE) rate[40] in the European Union-27 (EU-27 excluding Germany) experienced only a marginal decrease from 20.2 percent to 19.3 percent. Among the EU subregions, Southern Europe (SE) experienced the largest decline in the AROPE rate, dropping from 24.6 percent in 2021 to 22.0 percent in 2022, a decrease of 2.6 percentage points. Conversely, Central Eastern Europe (CEE) exhibited the lowest decline, with its AROPE rate decreasing only slightly from 17.8 percent to 16.4 percent, marking a reduction of 1.3 percentage points. Other subregions, such as Northern Europe (NE) and Western Europe (WE), experienced increases in their AROPE rates during the same period (Figure 1 and Table A3.1).

Some EU member states present strikingly divergent trends in multidimensional poverty compared to the EU average. Greece stands out with a striking absolute decrease of 3.7 percentage points. Conversely, Sweden, France and Finland experienced a notable increase (2.1, 2.0 and 1.2 percentage points) (Figure 2 and Table A3.2). Despite the heterogeneous changes in anchored AROPE rates, nearly three-quarters of European countries have reduced multidimensional poverty between 2021 and 2022 (standing significantly below the 45-degree line in Figure 2). Bulgaria and Romania experienced changes ranging from an increase of 0.5 percentage points to a decrease of 1.8 percentage points. Despite these changes, both countries continue to have extremely high incidences by European standards.

[39] In practice, attrition and the incompleteness of data may impede the seamless tracking of individuals or households over extended periods and pose potential limitations on the overall accuracy and reliability of the findings.

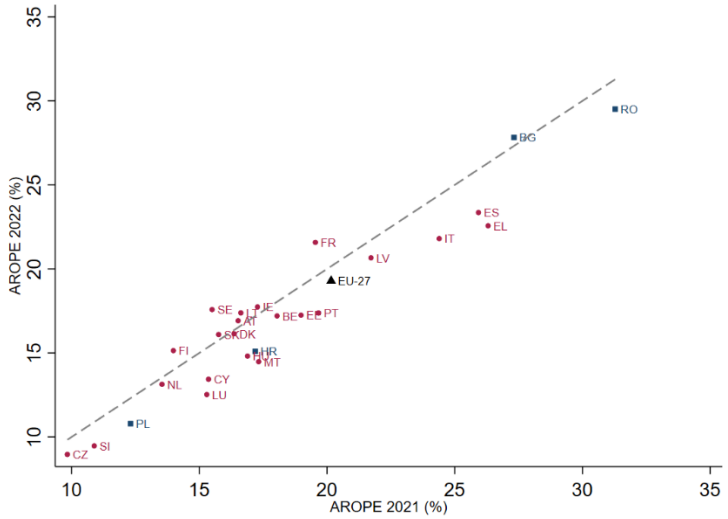
[40] To monitor AROPE over time, we construct an absolute measure of anchored AROPE, or at Risk of Poverty or Social Exclusion with an Anchored Income Threshold. This indicator modifies the traditional AROPE indicator, by adjusting the income threshold used to measure poverty or social exclusion to account for changes in the overall standard of living over time. This adjustment helps to ensure that the poverty threshold remains fixed and consistent across different years, allowing for more accurate comparisons of poverty rates over time.

Figure 1. Anchored AROPE rates (2022) and annual variation (2021-2022), EU27 (excluding Germany) and sub-regions



Note: Percentage of individuals (using survey weights). Regional averages are weighted by the country's population. The poverty threshold of the AROP dimension is anchored to the 2019 survey year. The Harmonized Consumer Price Index (HCPI) is used to deflate income aggregates. Table A3.1 reports AROPE rates by sub-region. Northern Europe (NE) consists of Denmark, Estonia, Finland, Latvia, Lithuania and Sweden. Southern Europe (SE) consists of Cyprus, Spain, Italy, Portugal, Malta and Greece. Western Europe (WE) consists of Austria, Belgium, France, Ireland, Luxembourg, and the Netherlands. Central Eastern Europe (CEE) consists of Bulgaria, Czechia, Hungary, Croatia, Poland, Romania, the Slovak Republic and Slovenia. EU-27 excludes Germany.
Source: Own estimates based on 2021-2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target. Eurostat does not report anchored AROPE rates.

Figure 2. Anchored AROPE rates (2021 and 2022) by country



Note: Percentage of individuals (using survey weights). The poverty threshold of the AROP dimension is anchored to the 2019 survey year. The Harmonized Consumer Price Index (HCPI) is used to deflate income aggregates. Table A3.2 reports AROPE rates by country and explains country acronyms. EU-27 excludes Germany. The 45-degree line reflects an equal AROPE rate between 2021 and 2022. A longer period is not presented due to the methodological changes in the AROPE definition (2020 vs 2030 targets).
Source: Own estimates based on 2021-2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target. Eurostat does not report anchored AROPE rates.

What is the current extent and composition of multidimensional poverty? A closer look at four EU countries: Romania, Bulgaria, Poland, and Croatia

Currently, one in five people living in the European Union is at risk of poverty or social exclusion, and in some countries, such as Bulgaria and Romania, this proportion is considerably higher. In 2022, Romania and Bulgaria experienced the highest AROPE rates (34.4 and 32.2 percent, respectively) in the region, whereas rates in Croatia (19.9 percent) and Poland (15.9 percent) were below the European average (21.6 percent). Across the EU, countries' disparities are not negligible; for example, multidimensional poverty in Romania nearly triples Czechia's rate.[41]

Bulgaria and Romania exhibit some of the highest levels of relative income poverty within the EU. Additionally, a considerable segment of the population in these countries faces risks that go beyond mere monetary deprivation. In recent years, the AROPE rate in Bulgaria and Romania has been more than nine percentage points higher than the AROP rate, reflecting the critical role of nonmonetary dimensions in poverty and their importance to general well-being**.** In 2021, Bulgaria's AROPE rate was 31.7 percent, significantly higher than its AROP rate of 22.2 percent. Similarly, Romania's was 34.5 percent, compared to an AROP rate of 22.5 percent. In 2022, these large differences persist. Bulgaria's AROPE rate slightly increases to 32.2 percent, while its AROP rate also rises to 22.9 percent. Romania sees a comparable pattern, with a large difference between the AROPE rate and the AROP (34.4 percent vs 21.2 percent). These updated figures reaffirm the persistent gaps between the two poverty indicators in these countries and highlight the importance of policies that not only target the income poor but also work in tandem to address the nonmonetary aspects of poverty.

Conversely, Croatia and Poland exhibit smaller differences between their AROPE and AROP rates. In 2021, Croatia's AROPE rate stood at 20.9 percent, slightly higher than its AROP rate of 19.2 percent. Similarly, Poland's AROPE rate was 16.8 percent in 2021, with an AROP rate of 14.8 percent. In 2022, similar small gaps are observed in both countries. Given the high correlation between these two indicators, policies targeting the income poor may also reach a high share of those deprived in non-monetary aspects in these countries.

To design effective policy interventions, it is crucial to understand the extent of monetary and non-monetary deprivation among individuals but also the severity of their deprivations, which entails understanding both the number and intensity of the deprivations they experience. Table 3 presents our estimates of the incidence of overlapping deprivations, including low work intensity, severe social and material deprivation, and income poverty indicators for the four EU countries in 2022. This joint distribution analysis allows us to identify the mismatches and overlaps between the measures.

In Romania and Bulgaria, not only is the extent of monetary and non-monetary deprivations higher, but so is the intensity of deprivations. On average, about one-third of multidimensionally poor individuals are deprived in more than one dimension, but there exist heterogeneities across countries (Table 3). In Bulgaria and Romania, 29.9 percent and 31.2

[41] Source: Eurostat, 2024

percent of the AROPE population are simultaneously deprived in two dimensions, respectively, indicating a higher intensity of deprivations, whereas in Croatia and Poland, this proportion is much lower (20.7 percent and 12.4 percent, respectively), suggesting a lesser degree of overlapping deprivations. Finally, a significantly large share of the multidimensionally poor population is deprived in all three dimensions in Bulgaria (9.4 percent), compared to Poland (2.9 percent).[42] Addressing the needs of the small proportion of individuals experiencing deprivation in all three dimensions is critical, especially in Bulgaria, requiring targeted approaches aimed at alleviating several issues simultaneously.

The nature of the deprivations is important for tailored policy responses to address the specific challenges faced by different populations within each country. In Bulgaria and Romania, there is a higher incidence of being severely material and socially deprived and at risk of poverty, underscoring the importance of comprehensive interventions targeting both monetary poverty (such as income support measures) and non-monetary dimensions related to living conditions (Table 3). Conversely, in Croatia and Poland, where there is a higher incidence of living in a household with low work intensity and being at risk of poverty, policy measures focusing on improving access to the labor market and promoting employment opportunities among the income poor may be critical.

While monetary poverty risks are comparable across the four countries, notable variations exist in non-monetary indicators, with Bulgaria and Romania showing higher material and social deprivation rates compared to Croatia and Poland. Even though the percentage of people who are exclusively at risk of poverty (so not deprived in other dimensions) is relatively similar across these countries (ranging from 9 percent to 12.7 percent), there are substantial differences in the incidence of the non-monetary indicators (Table 3). For instance, Bulgaria and Romania have a higher proportion of individuals who are only materially and socially deprived (7.6 percent and 12.4 percent, respectively) in comparison to Croatia (1.0 percent) and Poland (1.1 percent).[43]

In Bulgaria and Romania, more than half of multidimensionally poor individuals are deprived of at least one non-monetary dimension. In these countries, being materially and socially deprived is the most relevant non-monetary dimension conditioning the AROPE status of individuals (Table 3). In Bulgaria, materially and socially deprived individuals represent 58.1 percent of the AROPE population, close to the 66 percent of the AROPE individuals that are monetary poor, whereas in Romania, they represent 70.4 percent of the AROPE population, which is even higher than the proportion of AROPE individuals that are monetary poor (61.7 percent). In contrast, the monetary dimension is the most important component of the AROPE

[42] Note that the rates corresponding to the percentage of individuals deprived in all three dimensions would be the AROPE rates if the criteria to construct the multidimensional poverty indicator were to be the intersection of deprivations rather than the union of deprivations.

[43] Even though the percentage of individuals living in families with low work intensity is relatively low (ranging from 2.9 percent in Poland to 6.2 percent in Bulgaria), their profile is significantly different from those not deprived in this dimension (Table A3.3). Across all countries, those individuals with low work intensity are more likely to live in families where the household head has attained primary education or less, is a renter, and is unemployed, retired, or inactive. Further, they are more prone to live with adults with unmet medical needs (except in Poland), to live in overcrowded homes, with three or more children, and to belong to vulnerable families receiving disability benefits, pensions and social aid.

measure in Croatia and Poland, given that 64 percent and 71 percent of the individuals at risk of poverty or social exclusion, respectively, are only poor in the monetary dimension – and are not deprived in the non-monetary indicators.

Table 3. Percentage of individuals deprived in each AROPE dimension by country (2022)

AROPE	Bulgaria	Croatia	Poland	Romania
Deprived in only 1 dimension				
low work intensity	1.0	0.8	1.0	0.6
severe material and social deprivation	7.6	1.0	1.1	12.4
at risk of poverty	11.0	12.7	11.4	9.0
Deprived in only 2 dimensions				
several material and social deprivation + low work intensity	0.7	0.03	0.1	0.2
at risk of poverty + low work intensity	1.5	2.4	1.2	0.6
at risk of poverty + several material and social deprivation	7.4	1.7	0.6	9.9
Deprived in 3 dimensions				
at risk of poverty + low work intensity + several material and social deprivation	3.0	1.2	0.5	1.7
national AROPE rate	32.2	19.9	15.9	34.4

Note: Percentage of individuals (using survey weights). AROPE rates of 2022 are not anchored to 2019, as in Figure 1 and Figure 2. AROPE identifies individuals as multidimensionally poor if they are deprived in at least one dimension (union criteria), so the national AROPE rate corresponds to the sum of individuals deprived in 1, 2, or 3 dimensions. See Table 1 and Table 2 for a detailed description of each AROPE dimension.
Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

An in-depth analysis of the items that compose the material and social deprivation dimension indicates that the most prevalent deprivations in all countries are the capacity to face unexpected expenses with one's own resources, to afford one week of annual holiday, and to replace worn-out furniture. Romania, followed by Bulgaria, has the largest proportion of individuals facing these household-level deprivations, with nearly half of the population not being able to afford these items (Table A3.4). Interestingly, Croatia has a similar percentage of individuals who cannot afford unexpected expenses (44.9 percent) and annual holidays (41.7 percent) in comparison to Bulgaria, despite having a very low proportion of individuals materially and socially deprived (3.9 percent). This suggests that Croatian households face significant challenges in their capacity to afford these items, as well as in their capacity to being confronted with payment arrears (on mortgage or rental payments, utility bills, hire purchase installments or other loan payments) (15.6 percent), even though they have relatively less difficulty in affording other household-level goods and services. In addition, a more heterogeneous pattern of the incidence of individual-level deprivations is found across countries. Bulgaria and Romania have the largest deprivation rates in each individual item (ranging from 8.6 to 32.7 percent in Bulgaria, and 9.5 and 35.6 percent in Romania), whereas in Croatia and Poland, the incidence of these deprivations is relatively low (from 1.4 to 7.7 percent in Croatia, and from 0.9 to 9.1 percent in Poland). Being able to spend a small amount of money each week on him/herself is one of the most prevalent deprivations in all four countries, reaching 35.6 percent of the

population in Romania and 7.7 percent in Croatia. However, replacing worn-out clothes with new ones imposes greater difficulties for individuals in Bulgaria (26.1 percent) and Croatia (5.4 percent), whereas not having regular leisure activities is a more common deprivation in Poland (9.1 percent) and Romania (32.2 percent), and not being able to have two pairs of properly fitting shoes in Bulgaria (32.7 percent).

Which households and individuals are more at risk of multidimensional poverty?

What kind of personal and household characteristics make individuals particularly susceptible to multidimensional poverty? Previous EU evidence shows that various factors contribute to the risk of poverty or social exclusion (AROPE) among different groups, including unemployment, single parenthood, old-age poverty, being a young person, educational attainment, disability, gender, ethnicity, or a combination of these elements (Duffy, 2020; Vaalavuo, 2015).

Individuals living in some vulnerable households (households receiving social aid, those with an unemployed member, single-elderly households, female-headed and households with three or more children under 18) are more prone to multidimensional poverty. Table 4 highlights distinct patterns regarding the incidence of multidimensional poverty across different household types, with notable variations observed among countries**.** In addition to households receiving social aid, those with an unemployed member, single-elderly households, households headed by females, and households with three or more children under 18 years old, single-elderly individuals are particularly vulnerable across all four countries. However, there are heterogeneities across countries with respect to which types of households tend to have larger AROPE rates compared to the national rate. In Romania and Bulgaria, for example, individuals living in large families (comprising five or more members)[44] have a significantly higher likelihood of experiencing multidimensional poverty. Conversely, in Croatia, households with a pensioner are notably more vulnerable. Though Roma are presumably one of the most vulnerable groups in these countries, unfortunately, it is not possible to identify them and measure their deprivations, as the EU-SILC survey does not contain ethnicity identifiers.

Table 4. AROPE rates for individuals living in vulnerable households (%) by country (2022)

vulnerable households	Bulgaria	Croatia	Poland	Romania
household with unemployed	65.7	36.5	39.0	75.7
single-elderly household	67.7	57.9	35.2	51.0
female-headed household	34.7	22.9	17.1	38.2
household with 3 or more children	69.1	27.8	22.2	68.9
household with 5 or more members	43.5	17.7	16.7	47.9
household with disability recipient	30.8	18.4	16.7	38.9
household with pensioner	35.1	25.6	16.0	33.0
household with social aid	69.1	66.5	53.5	-

[44] The type of households composed by 3 or more children and by 5 or more members capture different populations, given that only a portion of the families with 5 or more members have 3 or more children – this proportion varies between 26% (Poland) and 38% (Croatia).

national AROPE rate	32.2	19.9	15.9	34.4

Note: Percentage of individuals (using survey weights). AROPE rates of 2022 are not anchored to 2019, as in Figure 1 and Figure 2. Children are defined as those younger than 18 and elderly, those 65+. Social aid is defined as those households that report incomes from social assistance captured in the SILC survey by social exclusion not elsewhere classified. This captures households receiving the main poverty-targeted programs (mean-tested) as well as other mean-tested programs. Households with social aid cannot be identified as a vulnerable group in the Romania EU-SILC. Pensioners are defined as those receiving old-age benefits. Statistics presented are unconditional AROPE means. Since households with disabled members cannot be identified in the EU-SILC surveys, we use as a proxy those receiving disability benefits.

Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

Multidimensional poverty is also higher among individuals who are deprived of other life domains, such as education, health, and housing, particularly in Bulgaria and Romania. The AROPE rate for individuals living with household heads who have only achieved primary education[45] doubles the national rate in all countries (Table 5). This is also the case for individuals living in families with unmet medical needs and in overcrowded houses[46] in Bulgaria and Romania (i.e., in countries with higher overall AROPE rates). These results shed some light on the potentially close relationship between being at risk of poverty or social exclusion and being deprived in additional dimensions apart from those included in the AROPE indicator.

Table 5. AROPE rates for individuals living in households with other deprivations (%) by country (2022)

other deprivations	**Bulgaria**	**Croatia**	**Poland**	**Romania**
education: household head with only primary education	70.1	43.2	33.3	65.2
health: at least one adult with unmet medical needs	54.1	29.4	18.3	61.6
housing: overcrowded house	66.8	21.9	22.1	63.0
national AROPE rate	32.2	19.9	15.9	34.4

Note: Percentage of individuals (using survey weights). AROPE rates of 2022 are not anchored to 2019, as in Figure 1 and Figure 2. Statistics presented are unconditional AROPE means. A person lives in an overcrowded house if the average number of people per room available to the household is greater than two. A person is deprived in health if at least one adult (16+) in the household has unmet needs for medical examination or treatment.
Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

The socio-economic and family profile of the multidimensionally poor is significantly different from the profile of the non-poor across all countries, with Bulgaria presenting the largest differences between the poor and non-poor. Table 6 shows the profile of the multidimensional poor (AROPE) vs. the non-poor (non-AROPE). On average, people living at risk of poverty or social exclusion are significantly more likely to be female and older (except in Romania). Household heads in these households tend to be less educated, unemployed, retired or inactive.[47] In

[45] The proportion of individuals living in households where the household head has achieved at most a primary level of education are as follows: Bulgaria: 22.9%, Croatia: 19.4%, Poland: 8.0%, Romania: 26.6%.

[46] Between 68% (Croatia) and 78% (Romania) of individuals living in an overcrowded house are families with 5 or more members, indicating that a non-trivial proportion of these individuals belong to less numerous families.

[47] The share of inactive female household heads ranges between 44% (Croatia) and 49% (Romania) for the AROPE individuals and between 48% (Poland) and 53% (Croatia and Romania) for the non-AROPE.

addition, multidimensionally poor individuals tend to be renters and are located in rural areas,[48] live in overcrowded houses and in families with unmet medical needs (except in Croatia). Regarding family structure, AROPE individuals are significantly more prone to live in families with three or more children in all countries analyzed, with older persons (+64 years old) in Bulgaria and Croatia and with fewer adults (18-64 years old) in Bulgaria, Croatia, and Poland. In addition, this analysis indicates that individuals living in female-headed households, with an unemployed person, with several children, as well as in families receiving social aid and single-elderly households, are more prone to be AROPE in all countries.

What are the key correlates of multidimensional poverty and its different components? We run several Probit models on the probability of an individual being income-poor, materially and socially deprived, living in a low-work intensity household, and being multidimensionally poor, conditioning by several factors (see Annex 4 for further methodological details and Table A4.1 to Table A4.4 for regression results for the survey year 2022). [49]

In all countries under analysis, the probability of being monetary poor is significantly lower for men, people living with a household head with secondary or tertiary education who is currently employed, and individuals in families composed of many working-age adults. For instance, the probability of being AROP for women is between 0.3 (in Poland) and 2.6 percentage points (in Croatia) larger than for males. Living in towns or suburbs and in rural areas, compared to people living in densely populated areas, is significantly associated with a higher likelihood of being monetary poor in all countries, but especially in Poland and Romania. In addition, individuals living in a household with unmet medical needs are significantly more prone to be at risk of poverty in all countries, reaching a larger probability in Bulgaria and Romania (of 4.2 and 5.4 percentage points). Individuals living in households with unemployed members, with three or more children, with social aid, and single-elderly are significantly more likely to be monetary poor in all countries.

[48] Only reporting statistically significant differences in means between groups (AROPE vs non-AROPE), with lower p-values indicating greater confidence in the observed differences (Table 6).

[49] Regression results are robust to using the 2021 survey year. Even though some coefficients differ in sign it does not affect out main results and conclusions (see Table A4.5 to Table A4.8).

Table 6. Profile of the AROPE individuals (2022) by country

	Bulgaria			Croatia			Poland			Romania		
	(i) Mean AROPE	(ii) Mean non-AROPE	(i) - (ii)	(i) Mean AROPE	(ii) Mean non-AROPE	(i) - (ii)	(i) Mean AROPE	(ii) Mean non-AROPE	(i) - (ii)	(i) Mean AROPE	(ii) Mean non-AROPE	(i) - (ii)
individual characteristics												
age	45.8	42.2	3.66***	50.4	41.9	8.49***	42.1	41.2	0.85***	41.3	42.1	-0.78**
male	0.44	0.50	-0.06***	0.43	0.50	-0.07***	0.46	0.49	-0.03***	0.47	0.50	-0.03***
head of the household												
home ownership	0.81	0.87	-0.06***	0.89	0.92	-0.03***	0.81	0.88	-0.07***	0.91	0.97	-0.05***
primary education	0.50	0.10	0.40***	0.42	0.14	0.28***	0.17	0.06	0.10***	0.50	0.14	0.36***
secondary education	0.41	0.54	-0.13***	0.52	0.61	-0.09***	0.72	0.58	0.14***	0.48	0.63	-0.16***
tertiary education	0.09	0.36	-0.27***	0.06	0.25	-0.19***	0.11	0.36	-0.25***	0.02	0.23	-0.20***
employed	0.31	0.70	-0.39***	0.20	0.59	-0.38***	0.41	0.64	-0.23***	0.44	0.63	-0.20***
unemployed	0.17	0.03	0.14***	0.14	0.03	0.11***	0.09	0.02	0.07***	0.02	0.00	0.01***
retired	0.35	0.22	0.13***	0.59	0.37	0.22***	0.25	0.23	0.02***	0.33	0.31	0.03***
inactive	0.15	0.04	0.11***	0.07	0.02	0.05***	0.25	0.11	0.14***	0.20	0.05	0.15***
student	0.01	0.01	0.00	0.00	0.00	0.00***	0.01	0.00	0.01***	0.01	0.01	0.01***
health: unmet medical needs	0.08	0.03	0.05***	0.14	0.09	0.05***	0.13	0.11	0.02***	0.27	0.08	0.19***
housing: overcrowded house	0.12	0.03	0.09***	0.03	0.03	0.00	0.07	0.04	0.02***	0.11	0.03	0.08***
household structure												
number of individuals <18	0.98	0.71	0.27***	0.79	0.83	-0.04*	0.97	0.92	0.06***	1.24	0.71	0.52***
number of individuals 18-64	1.83	2.13	-0.29***	1.52	2.35	-0.82***	2.26	2.41	-0.14***	2.18	2.10	0.08***
number of individuals >64	0.48	0.39	0.09***	0.69	0.47	0.22***	0.52	0.56	-0.03***	0.43	0.45	-0.03**
vulnerable households												
female-headed hh	0.67	0.59	0.07***	0.39	0.33	0.06***	0.74	0.68	0.06***	0.50	0.43	0.08***
hh with unemployed	0.32	0.08	0.24***	0.34	0.15	0.19***	0.17	0.05	0.12***	0.06	0.01	0.05***
single-elderly hh	0.20	0.05	0.16***	0.18	0.03	0.15***	0.10	0.03	0.06***	0.10	0.05	0.05***
household with 3 or more children	0.13	0.03	0.10***	0.14	0.09	0.05***	0.13	0.09	0.04***	0.15	0.04	0.11***
hh with 5 or more members	0.23	0.14	0.09***	0.22	0.26	-0.03***	0.38	0.36	0.02***	0.32	0.18	0.14***
hh with disability recipient	0.47	0.51	-0.03***	0.44	0.48	-0.05***	0.55	0.53	0.03***	0.55	0.45	0.10***
hh with pensioner	0.43	0.38	0.05***	0.51	0.37	0.14***	0.46	0.46	0.00	0.35	0.37	-0.02***
hh with social aid	0.25	0.05	0.20***	0.08	0.01	0.07***	0.05	0.01	0.04***	-	-	-
location												
cities	0.32	0.49	-0.17***	0.23	0.34	-0.11***	0.22	0.36	-0.14***	0.17	0.38	-0.21***
towns and suburbs	0.26	0.25	0.01*	0.30	0.32	-0.02***	0.25	0.29	-0.04***	0.24	0.29	-0.04***
rural areas	0.42	0.26	0.16***	0.47	0.34	0.13***	0.52	0.35	0.17***	0.59	0.34	0.25***

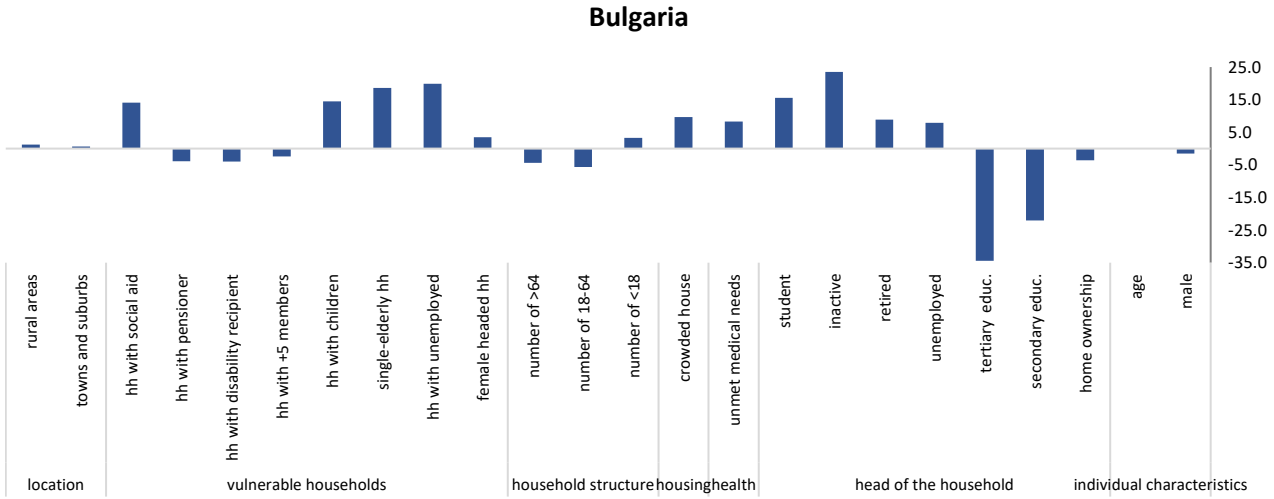
Note: Data is at the individual level and weighted accordingly using survey weights. Based on the AROPE status of 2022. Columns (i) – (ii) report t-tests on the equality of means. *p < 0.1, ** p < 0.05, *** p < 0.01. Values reflect mean in observable characteristics, conditioning on being AROPE or non-AROPE. Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

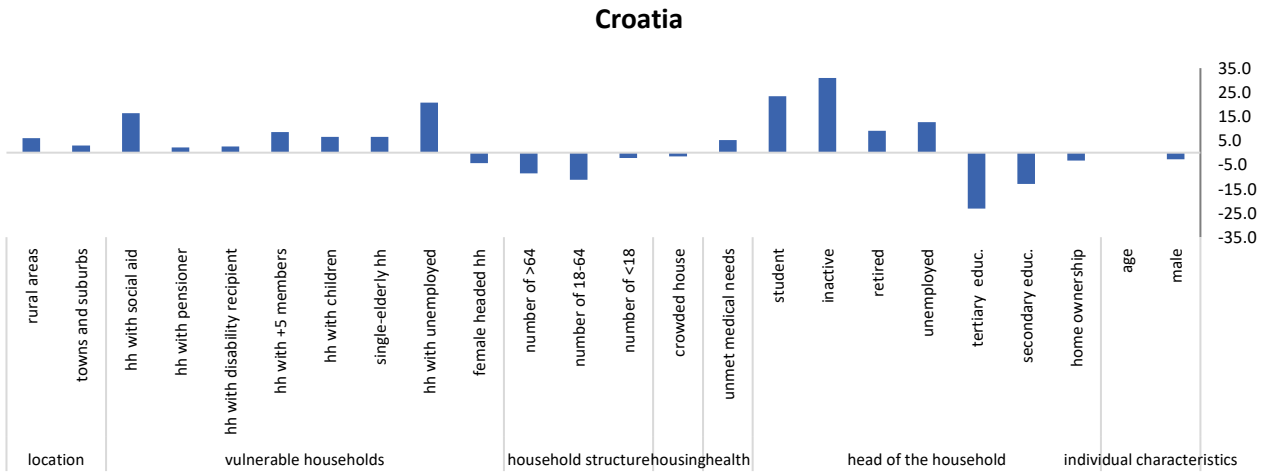
Similar to the factors conditioning monetary poverty, the chances of living in a household with low work intensity are larger for women but lower for individuals living with a more educated and employed household head and with several adults. More specifically, individuals living in households in which the head has attained secondary or tertiary education are between 3.0 and 6.2 percentage points less likely to live in a household with low work intensity. The marginal effect of being more educated is comparatively larger in Bulgaria and Romania, suggesting that achieving secondary or tertiary education in these countries may marginally improve labor market outcomes to a larger extent. In addition, household composition matters. For individuals living in households with many children, the likelihood of residing in a household with low work intensity is lower, especially in Croatia and Poland. Further, and in addition to those vulnerable households that are more prone to be monetary poor (households with an unemployed, with three or more children, and with social aid), households with a disability recipient or with a pensioner are also more likely to be in a family with low work intensity.

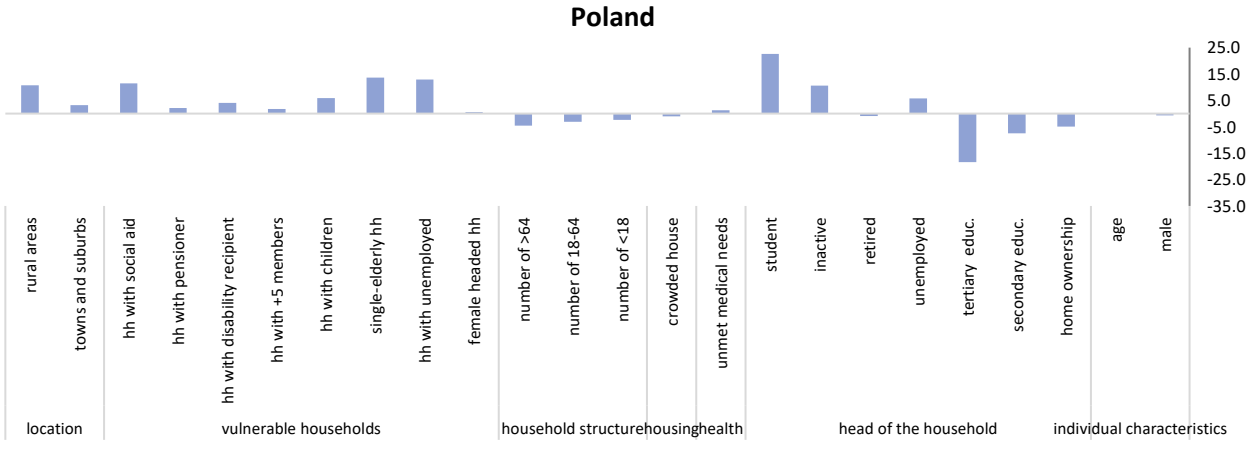
In addition to gender, education, and employment, being a homeowner, living in an overcrowded house, and having unmet medical needs are important correlates of material and social deprivation in all countries. Households with an unemployed member or receiving social aid are also significantly more likely to have these deprivations. Individuals living in an owned house are less likely to be materially and socially deprived, whereas individuals in overcrowded houses and in families with unmet medical needs are significantly more likely. These patterns are more evident for individuals in Bulgaria and Romania. For instance, homeowners in Romania are 6.1 percentage points less likely to have material and social deprivations, but individuals living in an overcrowded house are 12.1 and 13.1 percentage points more likely in Bulgaria and Romania, respectively. In turn, if adults have unmet medical needs, the likelihood of being materially and socially deprived increases by 10.9 and 20.1 percentage points, respectively.

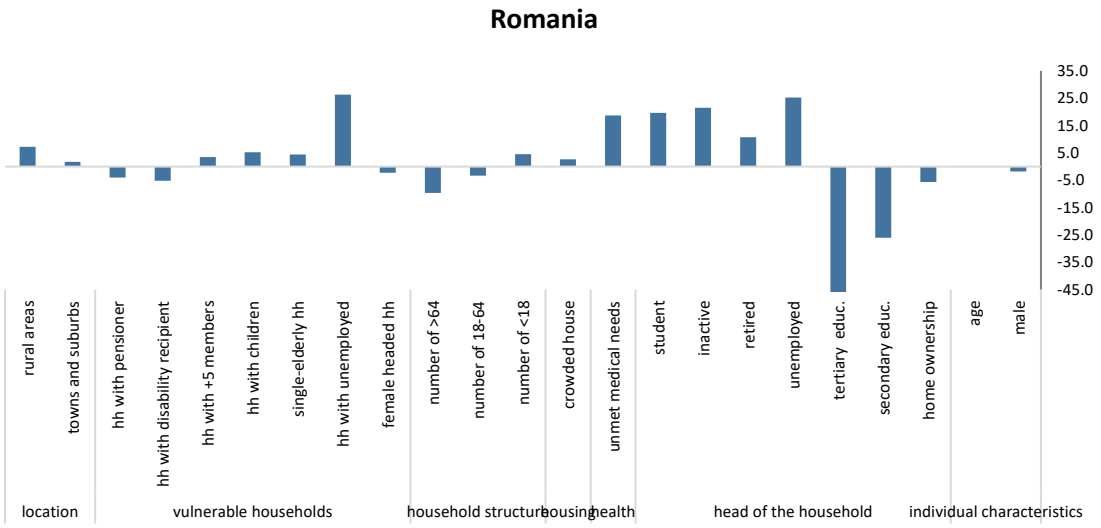
The probability of being multidimensionally poor is conditioned by the same patterns across countries. The probability of being AROPE is larger for women, home renters, individuals living with less educated heads who are unemployed, retired, or inactive, individuals living in families with unmet medical needs, with several adults, and individuals living in suburbs or towns and in rural areas (Figure 3). Similar patterns across countries are also found when analyzing vulnerable families. Individuals are more likely to be AROPE in all countries if they live in households with an unemployed person, with a recipient of social aid, with three or more children, or if they are single-elderly individuals. Bulgaria exhibits the largest probability of being AROPE for those individuals in households with three or more children and for single-elderly individuals (14.5 and 18.6 percentage points, respectively), whereas Croatia exhibits the largest likelihood for individuals in households receiving social aid (16.4 percentage points) and Romania for individuals in families with an unemployed person (26.3 percentage points).

Figure 3. Probability of being AROPE (2022), marginal effects by country









Note: Average marginal effects from the Probit regressions expressed as percentage points. See Annex A4 for further details on the regression analysis. See Table A4.1 to Table A4.4 for regressions results. Households with social aid cannot be identified as a vulnerable group in the Romania EU-SILC.
Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

The unconditional analysis (descriptive results reported in Table 6) gives us a considerably good approximation of the profile of the AROPE. The profile of the AROPE population in terms of their individual and socio-economic characteristics (gender, education, employment status, home property, and location) is the same under the unconditional analysis (Table 6) and under the conditional analysis (regression results reported in Table A4.1 to Table A4.4 and Figure 3). Further, the conclusions about which type of households are more vulnerable to being multidimensionally poor across all countries are the same, except for female-headed households, which were identified as more likely to be AROPE in the unconditional analysis in all countries, but only in Bulgaria and Poland after controlling for other relevant characteristics.

The analysis of the factors related to multidimensional poverty can point out key policy areas. The fact that being more educated and being employed is systematically associated with a lower probability of being multidimensional poor highlights the important role of implementing and enhancing policies that promote labor force participation, access to economic opportunities, and the accumulation of human capital. Policies in these areas may contribute to lessening the incidence of multidimensional poverty through multiple mechanisms – either by reducing monetary poverty via rising labor income, by improving work intensity within the family, or by diminishing some of the multiple material and social deprivations. Further, since homeowners are less prone to endure material and social deprivations, but individuals living in overcrowded houses are more likely to, tackling multidimensional poverty may need policies that also address access to housing, especially in Bulgaria and Romania. Additionally, public health policies may have positive externalities on the reduction of multidimensional poverty since individuals living in families with unmet needs for medical examination or treatment experience a higher

probability of being multidimensionally poor. Some EU countries have adopted an integrated approach to social services, encompassing comprehensive support to address diverse needs.[50]

How does the extension of the AROPE indicator contribute to our understanding of multidimensional poverty?

About half of the population in Bulgaria, Croatia, and Romania are AROPE +, mainly because of the large percentage of individuals who are educationally deprived. These countries exhibit the highest AROPE + rates, reaching 45.0, 46.2, and 53.6 percent of the population, respectively (Table 7). The proportion of individuals deprived in the education dimension is 29.2 percent in Bulgaria, 34.0 in Croatia, and 38.4 percent in Romania, representing 64.9, 73.6, and 71.7 percent of the AROPE + population, respectively. In addition, Romania has the highest rate of individuals who live in households in which the adults have unmet medical needs (14.7 percent), followed by Poland (11.7 percent) and Croatia (10.3 percent). Romania and Bulgaria have the largest proportion of individuals materially and socially deprived when incorporating the overcrowding indicator.[51] Poland has the lowest AROPE + rate as well as the lowest AROPE rate.[52]

Table 7. AROPE + rates and raw headcounts of AROPE + dimensions, by country (2022)

	Bulgaria	Croatia	Poland	Romania
Panel (A): national rates				
AROPE +	45.0	46.2	38.6	53.6
Panel (B): raw headcount of each dimension				
AROP	22.9	18.1	13.7	21.2
low work intensity	6.3	4.4	2.9	3.2
material and social deprivation +	19.0	4.2	3.0	24.5
Education	29.2	34.0	22.7	38.4
Health	4.8	10.3	11.7	14.7

Note: Percentage of individuals (using survey weights). AROPE + is an extension of AROPE. Material and social deprivation + extends the material and social deprivation included in the AROPE to incorporate if the person lives in an overcrowded house (that is, if the average number of people per room available to the household is greater than two). A person is educationally deprived if at least one adult in the household has only attained primary education (or less). A person is deprived in health if at least one adult in the household has unmet needs for medical examination or treatment during the last twelve months.
Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

Nearly half of the individuals who are AROPE + in Bulgaria and Romania are deprived in more than one dimension. In contrast, in Croatia and Poland, 65.6 percent and 73.8 percent of the individuals who are AROPE + are deprived in only one dimension (Table 8). However, 21.5

[50] In Finland, integrated service centers in municipalities offer comprehensive social services like counseling, employment support, housing assistance, and healthcare. Meanwhile, Germany's federalism model emphasizes cooperation between federal and Länder governments for effective policy coordination. Both approaches aim to enhance outcomes by providing coordinated support to address diverse needs (World Bank, forthcoming).
[51] The headcount of the material and social deprivation dimension included in AROPE + is between 0.2 and 0.3 percentage points higher than the material and social deprivation of the AROPE because only between 2.8 percent (in Croatia) and 6.1 percent (in Romania) of the population lives in an overcrowded house.
[52] Table A3.5 shows that all dimensions of AROPE + are significantly correlated. Specifically, interrelationships between dimensions are stronger for Bulgaria and Romania, suggesting a larger degree of overlapping (that is, proportionally more individuals deprived in more than one dimension) in these countries.

percent and 23.1 percent of the AROPE + population in Bulgaria and Romania, respectively, have simultaneously three or four deprivations, whereas only 10.4 percent in Croatia and 4.7 percent in Poland. Nearly 1 percent of the AROPE + individuals living in Bulgaria, Croatia, and Romania are deprived in all dimensions. The analysis of simultaneous deprivations is important because understanding the pattern of associations and overlaps across the core dimensions of multidimensional poverty is a key element for policymaking (Ferreira and Lugo, 2012).

Table 8. Overlapping of AROPE + dimensions by country (2022)

AROPE +	Bulgaria	Croatia	Poland	Romania
Deprived in only 1 dimension	50.6	65.6	73.8	47.3
Deprived in only 2 dimensions	26.7	23.2	21.3	28.8
Deprived in only 3 dimensions	15.6	8.3	3.7	17.4
Deprived in only 4 dimensions	5.9	2.1	1.0	5.7
Deprived in only 5 dimensions	1.2	0.8	0.1	0.9

Note: Percentage of individuals that are AROPE + and are deprived in multiple dimensions (using survey weights). The different permutations are not presented due to the dimensionality issue.
Source: Own estimates based on 2022 EU-SILC. We report the survey year, and not the income year.

The incidence of our extended version of multidimensional poverty is substantially high among all types of vulnerable households, but some families are particularly more affected in some countries. All vulnerable households considered have AROPE + rates above national rates –with the exception of households with a disability recipient in Bulgaria and Croatia (Table 9). Individuals living in households receiving social aid, with an unemployed member or single-elderly households are considerably more prone to be AROPE + in all countries. In addition, individuals living in families with a pensioner are particularly more likely to be AROPE + in Croatia, whereas this is the case for large families in Bulgaria and Romania.

Table 9. AROPE + rates for individuals living in vulnerable households (%), by country (2022)

vulnerable households	Bulgaria	Croatia	Poland	Romania
household with unemployed	76.4	61.1	65.0	85.8
single-elderly household	73.2	71.7	47.3	71.4
Female-headed household	47.0	46.2	41.7	58.0
household with 3 or more children	78.5	47.4	42.8	78.1
household with 5 or more members	65.0	54.3	48.4	74.1
household with disability recipient	44.1	43.5	40.5	57.2
household with pensioner	52.1	59.9	45.3	63.9
household with social aid	87.9	80.9	77.3	-
national AROPE+ rate	45.0	46.2	38.6	53.6

Note: Percentage of individuals (using survey weights). AROPE rates of 2022 are not anchored to 2019, as in Figure 1 and Figure 2. Children are defined as those younger than 18 and elderly, those 65+. Social aid is defined as those households that report incomes from social assistance captured in the SILC survey by social exclusion not elsewhere classified. This captures households receiving the main poverty-targeted programs (mean-tested) as well as other mean-tested programs. Households with social aid cannot be identified as a vulnerable group in the Romania EU-SILC. Pensioners are defined as those receiving old-age benefits. Statistics presented are unconditional AROPE means. Since households with disabled members cannot be identified, we use as a proxy those receiving disability benefits.
Source: Own estimates based on 2022 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

What is the state of multidimensional poverty among the Roma population in Bulgaria? Are they more likely to be chronically poor and materially and socially deprived?

The Roma population is inherently different from its national counterpart. Roma individuals are more likely to be young, to belong to families with less educated, unemployed or retired household heads, and to live in towns/suburbs or rural areas (Table A3.6). Further, the Roma population faces significantly higher chances of renting their homes, living in overcrowded houses, and having unmet medical needs. Roma individuals also are more prone to live in more numerous families, with many children, with a disability recipient, and with members receiving social aid. Overall, these statistics reflect that the Roma community is an extremely vulnerable group across several demographic, social, and economic dimensions.

The incidence of both monetary and non-monetary deprivations among the Roma population is extremely high compared to the Bulgarian population. In 2021, 58.8 percent of the Roma population[53] was at risk of poverty– a proportion that was markedly above the national rate of 22.1 percent. The proportion of the Roma population that was materially and socially deprived was more than three times the national average, whereas the percentage of individuals living in a household with low work intensity was more than four times the national average (Table 10). As a result, the AROPE rate, representing the percentage of individuals deprived in at least one of the AROPE dimensions, was markedly higher among the Roma population (78.7 percent) compared to the general Bulgarian population (31.7 percent).[54] The Roma population is significantly overrepresented among the multidimensionally poor since 25.9 percent of the AROPE individuals are Roma –whereas only 3.3 percent of the non-AROPE are Roma. A closer examination of the different components of the material and social deprivation dimension[55] indicates that between 65 and 75 percent of the Roma community cannot afford annual holidays, or unexpected expenses paid with own resources, or replacement of worn-out furniture, or replacement of worn-out clothes or cannot afford having two pairs of properly fitting shoes. These are the most prevalent categories of material and social deprivations among the Roma but also among the overall Bulgarian population – but at the national level, the prevalence is lower (between 34 and 41 percent). In turn, the items relative to internet access, arrears in housing costs and social inclusion are among the least prevalent items of deprivations, both among the Roma and the national population.

Further analysis reveals a greater intensity of deprivations experienced by the Roma community. When looking at the degree of overlapping deprivations, 3.8 percent of the Roma population experience both low work intensity and material and social deprivation, whereas only 1.0 percent of Bulgarians fall into this category (Table 10). 4.4 percent of the Roma population experience both low work intensity and are at risk of poverty, compared to 1.3

[53] The Roma population interviewed in the survey represents 10.4% of the overall population. This figure from the EU-SILC is in line with the estimate of the Roma population in Bulgaria (10.2%) obtained using the data from the Council of Europe (2012).

[54] Own estimates based on 2021 Bulgaria SILC. National estimates are also consistent with Eurostat and those published by the Bulgarian National Statistics Institute, and Roma estimates are also consistent with those published by the Bulgarian National Statistics Institute.

[55] Source: National Statistical Institute of Bulgaria.

percent in the general Bulgarian population. Remarkably, 23.7 percent of the Roma population are simultaneously at risk of poverty and materially and socially deprived, while this figure is much lower at 7.5 percent among Bulgarians. The most severe situation is observed among individuals simultaneously deprived in all three dimensions, with 17.9 percent of the Roma population experiencing poverty, low work intensity, and material and social deprivation, compared to 2.9 percent in the general Bulgarian population. Overall, these findings underscore the disproportionate levels of multidimensional poverty and social exclusion faced by the Roma population compared to the general population of Bulgaria as well as the intersecting challenges.

Table 10. Percentage of individuals deprived in each AROPE dimension, National average and Roma population (2021)

AROPE	Bulgaria	Roma
Deprived in only 1 dimension		
low work intensity	0.9	0.3
severe material and social deprivation	7.7	15.8
at risk of poverty	10.4	12.9
Deprived in only 2 dimensions		
several material and social deprivation + low work intensity	1.0	3.8
at risk of poverty + low work intensity	1.3	4.4
at risk of poverty + several material and social deprivation	7.5	23.7
Deprived in 3 dimensions		
at risk of poverty + low work intensity + several material and social deprivation	2.9	17.9
national AROPE rate	31.7	78.7

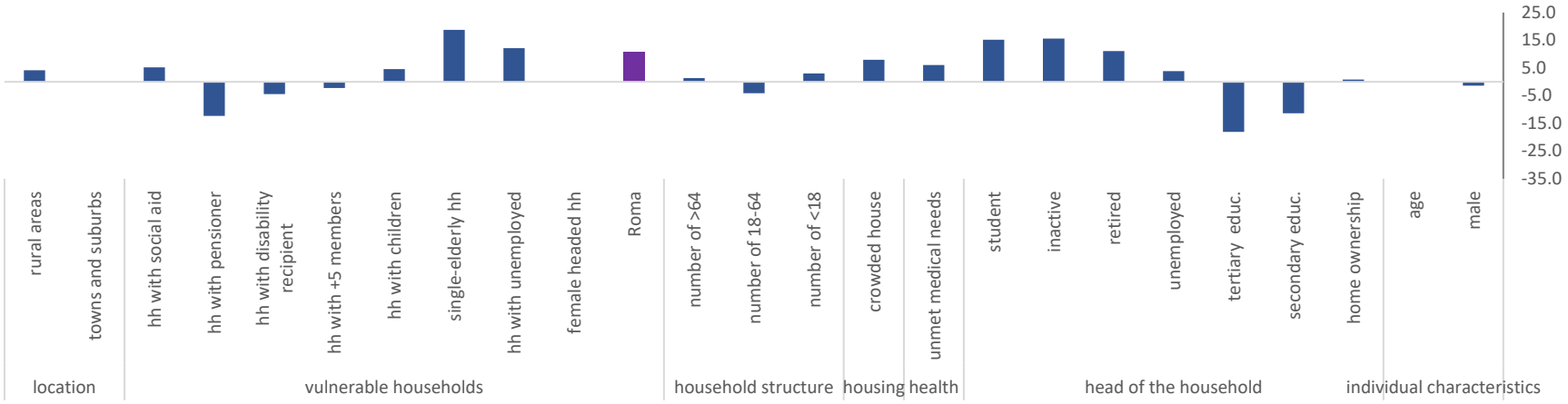
Note: Percentage of individuals (using survey weights). See Table 1 and Table 2 for a detailed description of each AROPE dimension.

Source: Own estimates based on 2021 Bulgaria SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

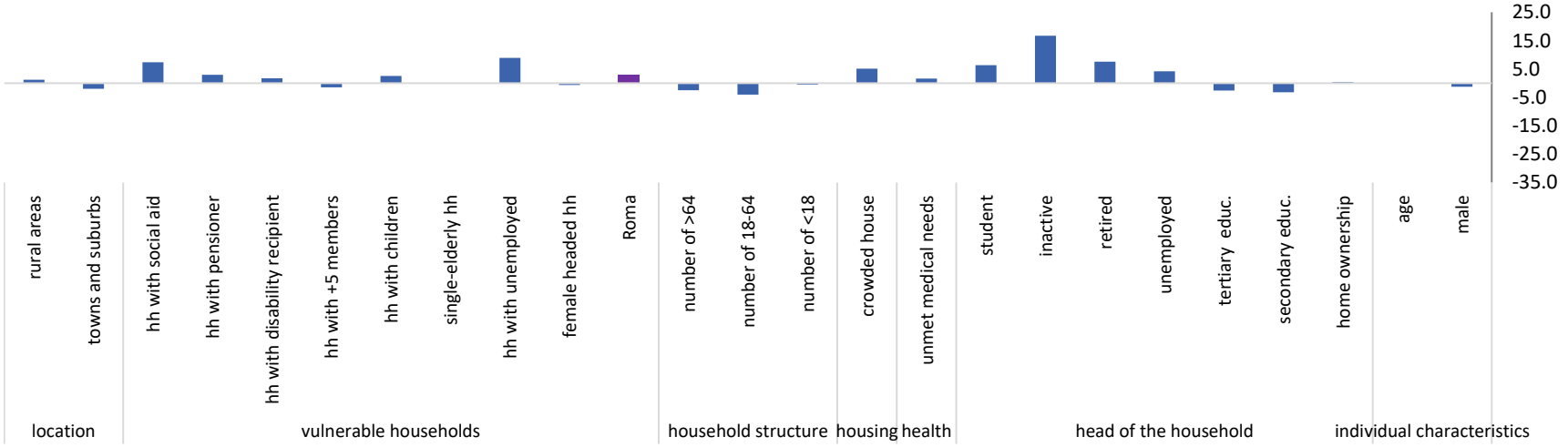
Even after accounting for relevant individual and family characteristics, Roma individuals still exhibit a significantly higher likelihood of experiencing income poverty, living in households with low work intensity, and enduring severe material and social deprivation compared to the Bulgarian population (Figure 4 and Table A4.9). Additionally, when examining conditional probabilities of being deprived in a particular dimension of multidimensional poverty, the AROPE rates for Roma households surpass those of all other vulnerable household types. Specifically, the probability of experiencing severe material and social deprivation among Roma households is notably higher by 12.8 percentage points, surpassing the estimated probability for other vulnerable households. Consequently, the overall likelihood of being classified as AROPE is markedly greater for Roma individuals, with a notable increase of 15.9 percentage points. This underscores the critical importance of properly identifying Roma as a vulnerable group using official household surveys and measures, targeting social policies to protect this group, and prioritizing fiscal support for the Roma community in national poverty reduction strategies aimed at alleviating poverty and social exclusion.

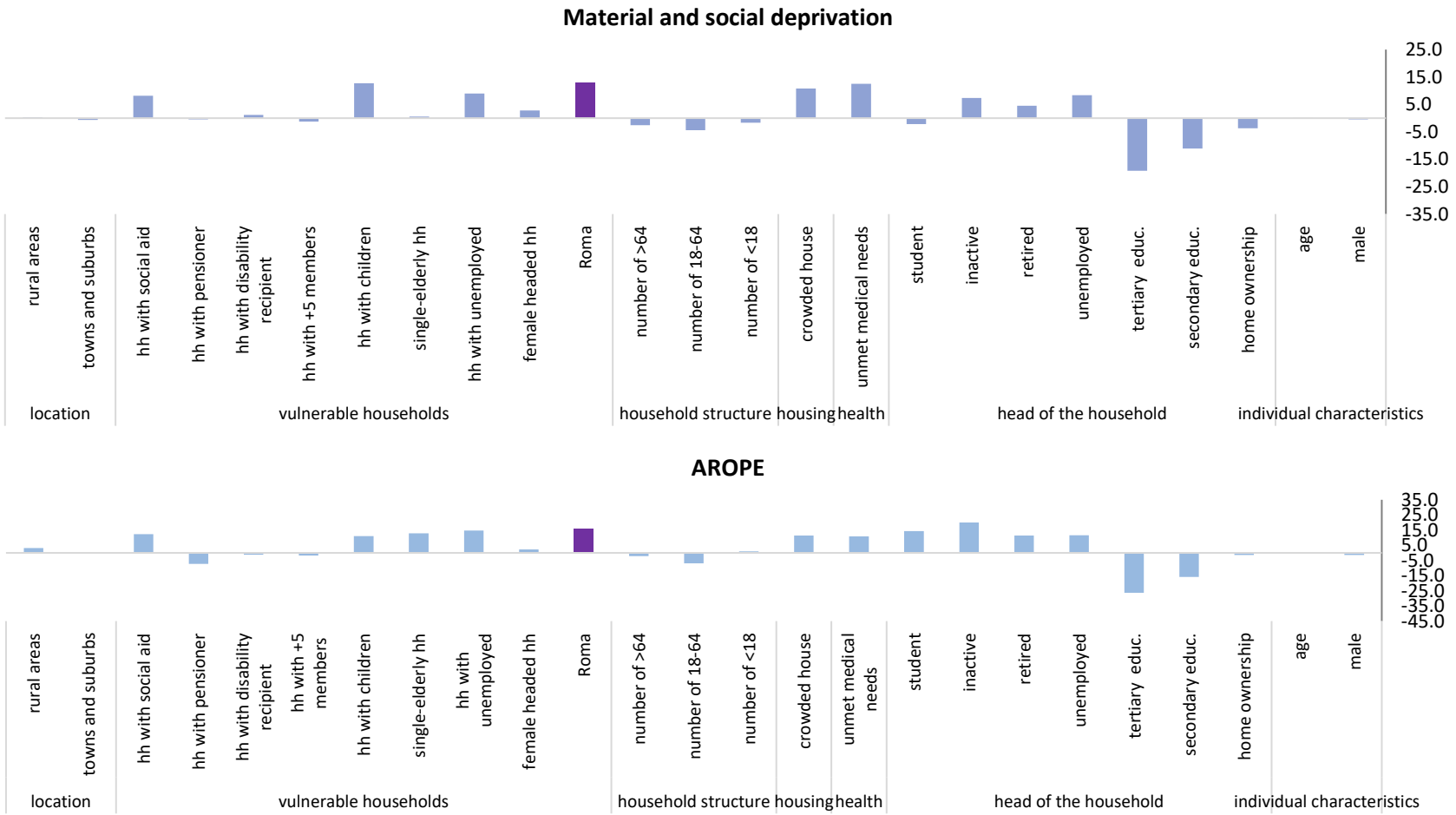
Figure 4. Probability of being AROPE (2021), Bulgaria

At risk of poverty



Low work intensity





Note: Average marginal effects from the Probit regressions are expressed as percentage points. See Annex A4 for further details on the regression analysis. See Table A4.9 for regressions results.
Source: Own estimates based on 2021 Bulgaria SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

When extending AROPE to include an education and health dimension and an extended version of severe material and social deprivation (AROPE +), the vast majority of Roma become multidimensional poor; this is mainly because a large proportion of the Roma population has only attained primary education. In particular, 94.4 percent of the Roma population is educationally deprived (Table 11). The Roma population is also more likely to be deprived of health access, with 9.6 percent of the Roma living in a household in which the adults have unmet medical needs, tripling the national proportion. Furthermore, Roma are more likely to live in an overcrowded house in comparison to the national population. In fact, 35.3 percent of the Roma live in an overcrowded house, in comparison to 6.1 percent of the total population in Bulgaria. When comparing the material and social deprivation of the AROPE with its extension of the AROPE +, results indicate that living in an overcrowded house increases the incidence of the material and social deprivation dimension by 1.4 percentage points for the Roma, but only by 0.2 percentage points for the overall Bulgarian population. Further, and similarly to the AROPE analysis, 21.2 percent of the AROPE+ individuals belong to the Roma community –whereas only 0.5 percent of the non-AROPE+ are Roma.

Table 11. AROPE + rates and raw headcounts, national average, and Roma population (2021)

	Bulgaria	**Roma**
Panel (A): rates		
AROPE +	48.1	97.4
Panel (B): raw headcount of each dimension		
AROP	22.1	58.8
low work intensity	6.1	26.4
material and social deprivation +	19.3	62.6
Education	32.9	94.4
Health	5.1	9.6

Note: Percentage of individuals (using survey weights). AROPE + is an extension of AROPE. Material and social deprivation + extends the material and social deprivation included in the AROPE to incorporate if the person lives in an overcrowded house (that is if the average number of people per room available to the household is greater than two). A person is educationally deprived if at least one adult in the household has only attained primary education (or less). A person is deprived in health if at least one adult in the household has unmet needs for medical examination of treatment during the last twelve months.
Source: Own estimates based on 2021 Bulgaria SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

Eight out of ten Roma who are considered AROPE + experience more than one deprivation, in comparison to nearly five out of ten at the national level. The proportion of the Roma population who are AROPE + and are deprived in more than one dimension is considerably large (Table 12); 30.0 percent is simultaneously deprived in three dimensions (compared to 15.1 percent at the national level), 18.6 percent is deprived in four dimensions (compared to 5.9 percent), and 2.9 percent in all five dimensions (compared to 0.7 percent). This result suggests that multidimensional poverty among the Roma should integrate a wide spectrum of policies.

Table 12. Overlapping of AROPE + dimensions, national average, and Roma population (2021)

AROPE +	**Bulgaria**	**Roma**
Deprived in 1 dimension	53.5	20.4
Deprived in 2 dimensions	24.8	28.1
Deprived in 3 dimensions	15.1	30.0

Deprived in 4 dimensions	5.9	18.6
Deprived in 5 dimensions	0.7	2.9

Note: Percentage of individuals that are AROPE + and are deprived in multiple dimensions (using survey weights).
Source: Own estimates based on 2021 Bulgaria SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

Moreover, the longitudinal analysis conducted shows that the Roma population faces high rates of chronic income poverty and chronic material and social deprivation. Further analysis of chronic poverty can lead to an identification of a sub-set of poor individuals facing particularly adverse circumstances and/or distinctive problems in escaping from poverty (Whelan et al., 2003). In 2021, 60.3 percent of the Roma were at persistent risk of poverty, and 62.2 percent suffered persistent material and social deprivation (Table 13).[56] These proportions largely exceed the national figures of 17.0 percent and 16.8 percent, respectively. In addition, almost half (45.8 percent) of the Roma population experiences both persistent poverty and material and social deprivation, which is five times larger than the national proportion.

These estimates indicate that Roma households may transition out of income poverty and material and social deprivation less frequently than Bulgarian households, indicating structural challenges individuals face in escaping this state. A high persistent rate of severe material and social deprivation suggests difficulty in overcoming these circumstances, underscoring its policy relevance comparable to or greater than the absolute number of individuals in such households in a given year. These disparities may indicate systemic and long-lasting challenges faced by the Roma population, which may require the need for tailored anti-poverty policies different from those tackling poverty at one point in time, as efforts should prioritize preventing poverty from becoming entrenched over time. Differentiating between temporary and persistent poverty is crucial because economic policy should prioritize preventing long-lasting poverty (Biewen, 2014).

Table 13. Persistent AROP and material deprivation, Bulgaria, National average and Roma population (2021)

	Bulgaria	**Roma**
Persistent AROP	17.0	60.3
Persistent severe material and social deprivation (SMSD)	16.8	62.2
Persistent AROP + persistent SMSD	9.0	45.8

Note: Percentage of individuals (using survey weights). The persistent at-risk-of-poverty indicator considers a person who was poor in the current year (2021) and in at least two of the three preceding years to be persistently poor.
Source: Own estimates based on 2021 Bulgaria Panel SILC. We report the survey year and not the income year. AROPE definition based on EU2030 target.

Remarkably, Roma individuals constitute a significant portion of those experiencing persistent at-risk-of-poverty (AROP) and severe material and social deprivation (SMSD) in Bulgaria. Specifically, 28.7 percent of those experiencing persistent AROP, 30.0 percent of those

[56] Our national estimate of persistent at risk of poverty slightly differs from the estimate published online by Eurostat. Further, note that the persistent AROP rate may be higher than the AROP rate at a given year because persistent AROP is computed using the panel data.

persistently in severe material deprivation, and 41.1 percent of those persistently experiencing both AROP and SMSD are Roma. These figures underscore the disproportionate levels of poverty and deprivation faced by the Roma community, highlighting the urgent need for targeted interventions to address their socio-economic challenges.

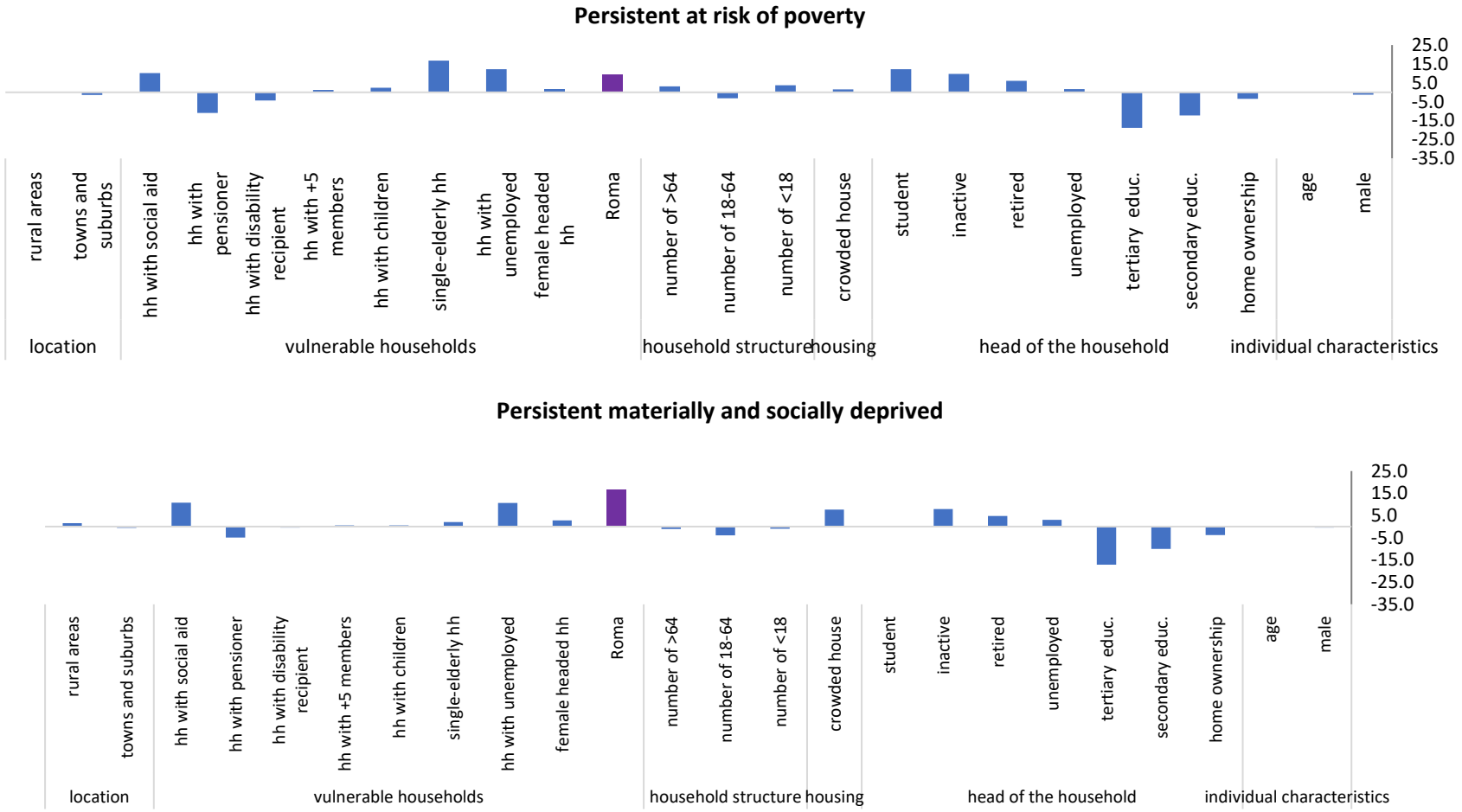
Some individuals and types of households are more likely to be chronically poor and deprived in Bulgaria. Women, less educated individuals, unemployed, retired or inactive individuals, as well as home renters and people living in rural areas, have a significantly higher probability of enduring persistent monetary poverty and material and social deprivations (Figure 5 and Table A4.10). In addition to the Roma community, female-headed households, households with an unemployed member, with three or more children, households receiving social aid, and single-elderly are significantly more prone to experience long-standing poverty and deprivations – in contrast, families with a disability recipient or a pension are less likely.

Knowing the profile of chronically poor and deprived individuals is a key element in the design of policies. Policies and actions should be context and group-specific, which means that identifying who are the individuals suffering from persistent deprivations is crucial to address the specific vulnerabilities they face (Chronic Poverty Research Center, 2011). In the case of Bulgaria, given that the composition (in terms of individual, socio-economic, and familiar characteristics) of the multidimensionally poor and the chronically poor and deprived is similar, some policies can simultaneously fight the two social phenomena (current and persistent deprivations). For instance, higher education, labor participation, and home property largely shield individuals from falling into multidimensional poverty but also from staying poor and enduring long-lasting material and social deprivations.

Different policies have been proposed in the literature to alleviate persistent monetary poverty and material deprivation. Because persistent poverty usually relates to poverty traps[57], it is important to design policies to prevent people from falling into poverty because once they are poor, chances are they will remain poor in the future. Promoting quality post-primary and vocational education, labor force participation, quality and quantity of jobs, and self-employment opportunities could be most effective in reducing the risks of chronic poverty. In addition, risks related to family structures can be addressed with policies that facilitate the balance of commitments between home and work, such as childcare subsidies (Addison et al., 2008). Social protection is also very valuable in interrupting risk and vulnerability among the chronically poor (Barrientos and Hulme, 2005). Access to quality health services and basic infrastructure to better connect disadvantaged rural areas to national markets are critical elements to prevent downward mobility into chronic poverty (Chronic Poverty Research Center, 2011).

[57] Distinguishing between persistent poverty caused by enduring unobserved characteristics versus causal poverty traps is challenging. The association between past and future poverty may reflect consistent background factors like health or motivation predisposing individuals to poverty each period (Biewen, 2014).

Figure 5. Probability of being persistent at risk of poverty and persistent materially and socially deprived (2021), Bulgaria



Note: Average marginal effects from the Probit regressions are expressed as percentage points. See Annex A4 for further details on the regression analysis. See Table A4.10 for regressions results.
Source: Own estimates based on 2021 Panel EU-SILC. We report the survey year and not the income year.

V. Conclusion and Policy Implications

The European Union showcases remarkable progress in living standards, yet welfare inequalities persist across its regions and demographic groups. Recent data indicates a decrease in the anchored at-risk-of-poverty (AROP) rate for EU27 countries, yet significant monetary poverty disparities endure among member states. Moreover, wide disparities in social and economic outcomes persist across diverse groups, potentially jeopardizing social cohesion and necessitating tailored policy responses.

Despite progress, multidimensional poverty remains a challenge. Analysis of individual countries reveals stark variations, with Romania and Bulgaria experiencing notably high poverty and social exclusion rates. Vulnerable groups such as the elderly and children are disproportionately affected, with rural-urban disparities exacerbating socio-economic deprivation. Distinguishing between temporary and persistent poverty is crucial for effective policy formulation, and systemic challenges persist, particularly among marginalized communities like the Roma. Addressing these multifaceted challenges necessitates comprehensive policy interventions tailored to different contexts and informed by accurate data collection methods that account for diverse population groups' specific needs**.**

To comprehensively analyze multiple deprivations and the at-risk-of-poverty or social exclusion (AROPE) indicators among vulnerable groups within the European Union, this paper relies on the latest cross-sectional and longitudinal data from the European Union Statistics on Income and Living Conditions (EU-SILC). This extensive survey spans 27 EU member states, along with Iceland, Norway, and Switzerland, collecting data on income, poverty, social exclusion, and living conditions of individuals aged 16 and above within private households, which employs a stratified multi-stage sampling approach, incorporating both cross-sectional and longitudinal data to capture individual-level changes over a four-year period. While enabling comprehensive AROPE monitoring across EU countries, the dataset lacks ethnicity information, precluding the assessment of deprivations among the Roma population. Nevertheless, to analyze poverty and multiple deprivations among the Roma community, we used the latest available national SILC data from Bulgaria (2021), leveraging the AROPE framework and the longitudinal components for a nuanced understanding of persistent socio-economic challenges among this group over time.

Our results show that the incidence of inequality in outcomes across a range of social and economic indicators is still high, with wide disparities between national averages and specific population groups (including Roma and other vulnerable and marginalized communities). This is important as it can potentially affect social cohesion and societal well-being (Vergolini, 2011; Wilkinson & Pickett, 2009) and reshape national and European policies and institutions.

While the European Union-27 (EU-27) witnessed a marginal decrease in absolute multidimensional poverty recently, different rates of progress are observed across EU subregions. Among the EU subregions, Southern Europe (SE) experienced the largest decline in the AROPE rate, dropping from 26.0 percent in 2020 to 24.2 percent in 2021, marking a decrease of 1.8 percentage points. Conversely, Central Eastern Europe (CEE) exhibited the lowest decline, with its AROPE rate decreasing only slightly from 17.4 percent to 16.8 percent, reflecting a small

reduction of 0.6 percentage points. Some member states present strikingly divergent trends in multidimensional poverty compared to the EU average. Spain had a remarkable absolute increase of 3.99 percentage points, while Sweden experienced a substantial decline of 3.19 percentage points.

In 2022, substantial disparities in multidimensional poverty were evident across Europe, with Romania and Bulgaria exhibiting the highest AROPE rates, respectively. In contrast, rates in Croatia and Poland were below the EU average. These discrepancies underscore the varied progress made in poverty reduction efforts among EU member states. Notably, a significant proportion of individuals experiencing multidimensional poverty are not captured by monetary poverty alone, highlighting the importance of considering nonmonetary dimensions for overall well-being. Moreover, while around one-third of multidimensionally poor individuals are deprived in multiple dimensions on average, there are notable variations across countries. Bulgaria and Romania exhibit higher multidimensional deprivation incidences than Croatia and Poland.

Multidimensional poverty profiles differ significantly among Bulgaria, Croatia, Poland, and Romania despite similar proportions of individuals solely at risk of poverty across these countries. Notably, Bulgaria and Romania have a higher prevalence of individuals experiencing material and social deprivation alone. In contrast, Croatia and Poland exhibit higher rates of individuals experiencing monetary poverty without other deprivations. The discrepancy in the importance of non-monetary dimensions is evident, with materially and socially deprived individuals comprising a larger proportion of the AROPE population in Bulgaria and Romania compared to Croatia and Poland.

The nature of deprivations is important for tailored policy responses to address the specific challenges faced by different populations within each country. Our results indicate considerable overlap between deprivations, suggesting a greater extent of interdependence. This evidence underscores the critical role of coordinated policy to effectively overcome multidimensional poverty. Further, policy interventions must address specific deprivation dimensions in the context of each country. For instance, in countries such as Croatia and Poland, where there is a higher incidence of individuals simultaneously living in low work-intensity households and living in poverty, policy measures could focus on improving access to the labor market and promoting employment opportunities. In contrast, in countries, such as Bulgaria and Romania, where it is more prevalent that individuals suffer simultaneously from material and social deprivations and poverty, other policies such as income support and measures to address living conditions are needed.

Vulnerability to multidimensional poverty varies significantly among individuals residing in different household types across European countries. Generally, households with unemployed members, single-elderly individuals, female heads, or three or more children are more susceptible to multidimensional poverty. However, there are notable disparities between countries regarding which household types exhibit higher AROPE rates compared to national averages. For instance, households with a disability recipient are particularly vulnerable in Romania. Further, these households are significantly more likely to have low work intensity. As a consequence, individuals living in households with a disability recipient may require social

services, such as assistance with respect to residential care, home care, community care, and rehabilitation centers. Social services can address the needs of people with disabilities by offering assistance with daily living tasks, aiding in employment endeavors, and facilitating accessibility accommodations (World Bank, forthcoming). Furthermore, multidimensional poverty is exacerbated among individuals facing additional deprivations, such as limited education, health issues, or overcrowded housing, particularly in Bulgaria and Romania. These findings highlight the complex relationship between poverty and various life domains, underscoring the need for targeted interventions addressing diverse deprivation dimensions to effectively address multidimensional poverty.

The socio-economic and familial characteristics of multidimensionally poor individuals differ significantly from their non-poor counterparts, with Bulgaria exhibiting the most pronounced differences. Across all countries, those at risk of poverty or social exclusion are more likely to be older, female, less educated, and unemployed, often residing in rural areas and overcrowded houses. Additionally, family structure plays a significant role, with AROPE individuals more commonly found in households with three or more children and older members. Conversely, factors such as higher education levels, employment status, and household composition involving more adults are associated with lower probabilities of experiencing multidimensional poverty. However, the impact of certain family characteristics on poverty vulnerability varies across countries, emphasizing the need for nuanced policy responses tailored to specific socio-economic contexts. Despite common patterns, certain household types are more vulnerable to poverty in specific countries.

Properly identifying groups to target with social policies is essential for ensuring that fiscal resources are used effectively and anti-poverty policies reach the intended population. However, the lack of ethnic identifiers in most EU household surveys poses a considerable challenge for policy formulation and implementation.

Our extended measure of multidimensional poverty (AROPE) indicates that about half of the population in Bulgaria, Croatia, and Romania are AROPE +, mainly because of the large percentage of individuals who are educationally deprived. This analysis shed light on the interrelationships across multiple core dimensions of well-being and on the degree of overlaps. The fact that nearly half of the individuals who are AROPE + are deprived in more than one dimension in Bulgaria and Romania may help us better understand how multidimensional poverty can be tackled with multiple different interventions.

When analyzing official data disaggregated by ethnicity in Bulgaria shows multidimensional poverty is notably prevalent within the Roma population in Bulgaria, starkly contrasting with national averages. A staggering 78.7 percent of the Roma face poverty or social exclusion, far exceeding the national rate of 31.7 percent. This disparity extends across various dimensions, with Roma individuals experiencing material deprivation and low work intensity at rates several times higher than the national average. Furthermore, a significant portion—17.9 percent—of the Roma population suffers from deprivation across multiple dimensions, a stark contrast to the mere 2.9 percent observed in Bulgaria's general population. The Roma community, as a vulnerable and marginalized group, could benefit from social services policies such as social support, targeted inclusion activities, employability, lifelong learning, and food security in order

to cater to their different needs and overcome barriers related to isolation and social norms (World Bank, forthcoming).

The vulnerability of the Roma community to multidimensional poverty in Bulgaria is pronounced, with higher probabilities of monetary poverty, low work intensity, and material and social deprivation even after accounting for other socio-economic factors. Particularly striking is the likelihood of material and social deprivation among the Roma, surpassing that of other vulnerable groups by 12.8 percentage points. These deprivations are more concentrated in material items that cannot be afforded, instead of items associated with social inclusion, exhibiting a lack of economic resources that could be compensated with income measures or educational policies to reduce educational inequalities that enable them to have better job opportunities and financial prospects. Education emerges as a critical factor, with the vast majority of the Roma lacking access to primary education. Additionally, disparities persist in health and housing conditions, with overcrowding prevalent among the Roma population. These findings underscore the urgent need for comprehensive policy interventions tailored to address the multifaceted dimensions of poverty within the Roma community, highlighting the structural nature of their poverty experiences.

Recommended policies to tackle persistent poverty include a wide spectrum of policies. These include improving educational outcomes, promoting job opportunities, alleviating the childcare burden of families with many children and working adults through subsidies, increasing social protection and access to health services and as well as improving road infrastructure for those living in rural areas (Addison et al., 2008; Barrientos and Hulme, 2005; Chronic Poverty Research Center, 2011).

Future lines of exploration could involve an in-depth analysis of material and social deprivation of children, as child poverty is a critical issue in some countries, such as Bulgaria and Romania. Other authors (Guio et al., 2018) have constructed and proposed a specific suitable and additive deprivation measured focused on the specific situation of children using the EU-SILC data, which could be implemented in future analysis.

The analysis on Roma in Bulgaria could potentially be extended to other countries, if ethnicity is regularly collected as part of the official household surveys to monitor income and living conditions. This is important to build consensus about who belongs under the "vulnerable population" rubric and could offer a more comprehensive overview of the risks and vulnerabilities that the Roma community faces.

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Annex 1. Availability of Ethnic Identifiers in Official Household Surveys

There is little information on both participation and the impact of policies on the Roma, primarily because of the difficulty of collecting reliable information on Roma ethnicity. Ethnicity is generally not a topic in nationally representative household surveys. Data sources with ethnic identifiers are scarce, stemming from the inherent difficulty of collecting reliable household-level data related to Roma ethnicity.

In Bulgaria, official household surveys such as labor force surveys and household budget surveys typically do not include questions on ethnicity. The exception is the National Survey on Income and Living Conditions (SILC), which started collecting ethnicity data in 2015. However, even within SILC data, several challenges persist. Firstly, ethnicity is self-identified, which implies that many Roma who do not explicitly identify as such are not accounted for. As a result, there is generally undercounting in censuses and undersampling in household surveys. Additionally, sample sizes may prove too small to draw robust conclusions, especially when examining smaller subgroups, such as young Roma females or Roma outcomes disaggregated by regional indicators (NUTS3 regions).

These data limitations and gaps impede efforts to identify ethnic disparities in crucial areas like healthcare, education, employment, housing, and access to services. They also hinder monitoring outcomes related to Roma inclusion and the evaluation of policies, particularly across different regions. This shortage of reliable, ethnicity-disaggregated data impedes tracking progress on Roma inclusion under the national action plans and assessing policy effectiveness.

To address this issue, there were collaborative efforts to design and implement a nationally representative survey encompassing vulnerable communities, including the Roma population. This initiative results from a partnership between the Fundamental Rights Agency (FRA) and the Bulgaria National Statistics Institute, with financial support from Norway. The survey is designed to cover a much larger sample, approximately 15,000 households, compared to the SILC. It aims to include diverse communities, including persons with disabilities and the Roma population. Unfortunately, the World Bank team does not have access to this microdata. Similarly, FRA also supported Roma data collection in the Slovak Republic.

This survey project holds promise for improving the quality of official data, enabling more reliable measurements of ethnic disparities. The ultimate objective is to facilitate the development of more effective national, state, and local interventions, aiming to eliminate ethnic disparities.

In Romania, data related to ethnicity is obtained through the Household Budget Survey. Nevertheless, it is important to note that the ethnic identifiers in this survey are derived from responses to a question about nationality. This introduces a certain degree of complexity, as the data collected may not exclusively reflect an individual's ethnicity but rather the broader concept of nationality.[58] This mix of nationality and ethnicity within the survey data can potentially lead to mixed or overlapping information, making it challenging to distinguish between these two distinct aspects of identity. As a result, the data may not provide a comprehensive and precise representation of the ethnic composition of the population, potentially affecting the accuracy of analyses related to ethnic disparities and policy interventions. However, similar to other countries (i.e., Estonia), the term nationality has a clear ethnic connotation in Romania, and previous empirical evidence uses nationality as a proxy for ethnic origin and relies on this survey for ethnic-related analysis in the country[59]. This underscores the need for careful consideration and appropriate methodologies when interpreting and utilizing ethnic data collected within the

[58] As mentioned in the UNECE Guide to Data Disaggregation for Poverty measurement (2021), "ethnic identity can be measured using a variety of concepts, including ethnic ancestry or origin, ethnic group, cultural origins, nationality, race, [skin] colour, minority status, tribe, language, religion – [and in numerous cases through proxy variables such as country of birth, country of birth of parents, citizenship] - or various combinations of these concepts"
[59] See Buligescu (2019).

Household Budget Survey in Romania. Administrative data sources are also not ordinality disaggregated by ethnicity.

Annex 2. Dimensions and Indicators of Different Multidimensional Measures

	AROPE 2030	UNDP-OPHI Multidimensional Poverty Index (MPI)	World Bank MPM
Monetary and Living Standards	Disposable income (after social transfers) below 60% of the national median Households with very low work intensity Cannot pay unexpected expenses Replacing worn-out clothes/shoes		Consumption or Income below 2.15$
Housing and Assets	Cannot pay rent or mortgage or utility bills Replacing worn-out furniture Having internet connection Lack of access to car	Housing Assets	
Utilities/Infrastructure	Heating	Electricity Drinking Water Sanitation Cooking Fuel	Electricity Drinking Water Sanitation
Education		Adult School Attainment (years of schooling) Child School Attendance	Adult School Attainment (years of schooling) Child School Attendance
Health and Nutrition	Capacity to afford a meal with meat, chicken, fish or vegetarian equivalent	Child Mortality Nutrition (children and adults)	
Leisure/Time Usage	Holidays Regular Leisure Activities Getting together with friends/family		

Source: Own elaboration based on World Bank, 2021, "A Roadmap for Countries Measuring Multidimensional Poverty."

Annex 3. Additional Tables

Table A3.1. Anchored AROPE rates, EU27 (excluding Germany) and sub-regions (2021 and 2022)

Sub-region	2021	2022	change (p.p.)
Northern Europe (NE)	16.1	17.0	0.9
Southern Europe (SE)	24.6	22.0	-2.6
Western Europe (WE)	18.1	19.2	1.1
Central Eastern Europe (CEE)	17.8	16.4	-1.3
EU-27 (excluding Germany)	20.2	19.3	-0.9

Note: Percentage of individuals (using survey weights). Regional averages are weighted by the population. The poverty threshold of the AROP dimension is anchored to the 2019 survey year. The Harmonized Consumer Price Index (HCPI) is used to deflate income aggregates. Northern Europe (NE) consists of Denmark, Estonia, Finland, Latvia, Lithuania and Sweden. Southern Europe (SE) consists of Cyprus, Spain, Italy, Portugal, Malta and Greece. Western Europe (WE) consists of Austria, Belgium, France, Ireland, Luxembourg, Netherlands and Germany. Central Eastern Europe (CEE) consists of Bulgaria, Czechia, Hungary, Croatia, Poland, Romania, the Slovak Republic and Slovenia. EU-27 excludes Germany. A longer period is not presented due to the methodological changes in the AROPE definition (2020 vs 2030 targets).

Source: Own estimates based on 2021-2022 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A3.2. Anchored AROPE rates, EU-27 countries (excluding Germany) (2021 and 2022)

Country	2021	2022	change (p.p.)
Austria (AT)	16.5	16.9	0.4
Belgium (BE)	18.0	17.2	-0.8
Bulgaria (BG)	27.3	27.8	0.5
Croatia (HR)	17.2	15.1	-2.1
Cyprus (CY)	15.4	13.4	-1.9
Czechia (CZ)	9.8	9.0	-0.9
Denmark (DK)	16.4	16.1	-0.2
Estonia (EE)	19.0	17.2	-1.7
Finland (FI)	14.0	15.1	1.2
France (FR)	19.5	21.6	2.0
Greece (EL)	26.3	22.6	-3.7
Hungary (HU)	16.9	14.8	-2.1
Ireland (IE)	17.3	17.7	0.5
Italy (IT)	24.4	21.8	-2.6
Latvia (LV)	21.7	20.7	-1.1
Lithuania (LT)	16.6	17.4	0.8
Luxembourg (LU)	15.3	12.5	-2.8
Malta (MT)	17.3	14.5	-2.8
Netherlands (NL)	13.5	13.1	-0.4
Poland (PL)	12.3	10.8	-1.5
Portugal (PT)	19.7	17.4	-2.3
Romania (RO)	31.3	29.5	-1.8
Slovak Republic (SK)	15.8	16.1	0.3
Slovenia (SI)	10.9	9.5	-1.4
Spain (ES)	25.9	23.4	-2.6
Sweden (SE)	15.5	17.6	2.1
EU-27 (excluding Germany)	20.2	19.3	-0.9

Note: Percentage of individuals (using survey weights). The poverty threshold of the AROP dimension is anchored to the 2019 survey year. The Harmonized Consumer Price Index (HCPI) is used to deflate income aggregates. EU-27 excludes Germany. A longer period is not presented due to the methodological changes in the AROPE definition (2020 vs 2030 targets).

Source: Own estimates based on 2021-2022 EU-SILC. We report the survey year and not the income year. Eurostat does not report anchored AROPE rates. AROPE definition based on EU2030 target.

Table A3.3. Profile of the individuals living in a household with low work intensity (LWI) (2022) by country

	Bulgaria			Croatia			Poland			Romania		
	(i) Mean LWI	(ii) Mean non-LWI	(i) - (ii)	(i) Mean LWI	(ii) Mean non-LWI	(i) - (ii)	(i) Mean LWI	(ii) Mean non-LWI	(i) - (ii)	(i) Mean LWI	(ii) Mean non-LWI	(i) - (ii)
individual characteristics												
age	32.1	33.5	-1.42**	36.1	32.5	3.65***	37.4	32.1	5.28***	31.5	32.7	-1.18
male	0.49	0.51	-0.02	0.51	0.50	0.01	0.54	0.52	0.02*	0.46	0.52	-0.06**
head of the household												
home ownership	0.75	0.83	-0.08***	0.84	0.90	-0.05***	0.71	0.87	-0.16***	0.90	0.94	-0.04***
primary education	0.67	0.18	0.49***	0.38	0.13	0.24***	0.25	0.06	0.19***	0.61	0.22	0.39***
secondary education	0.26	0.51	-0.24***	0.55	0.63	-0.08***	0.67	0.58	0.09***	0.38	0.60	-0.22***
tertiary education	0.07	0.31	-0.25***	0.08	0.24	-0.16***	0.08	0.36	-0.27***	0.01	0.18	-0.17***
employed	0.09	0.77	-0.68***	0.06	0.73	-0.67***	0.07	0.74	-0.66***	0.06	0.76	-0.70***
unemployed	0.40	0.07	0.33***	0.34	0.05	0.30***	0.15	0.03	0.12***	0.06	0.01	0.05***
retired	0.14	0.08	0.06***	0.46	0.19	0.27***	0.25	0.09	0.16***	0.26	0.12	0.14***
inactive	0.36	0.07	0.29***	0.13	0.03	0.10***	0.52	0.13	0.39***	0.60	0.10	0.50***
student	0.01	0.01	0.00	0.002	0.001	0.00	0.01	0.004	0.01***	0.02	0.01	0.01*
health: unmet medical needs	0.18	0.04	0.14***	0.21	0.09	0.12***	0.12	0.12	0.01	0.34	0.11	0.24***
housing: overcrowded house	0.23	0.06	0.17***	0.03	0.04	-0.01	0.09	0.05	0.03***	0.16	0.07	0.09***
household structure												
number of individuals <18	1.61	0.98	0.63***	0.99	1.10	-0.12***	0.82	1.12	-0.31***	1.24	1.12	0.12*
number of individuals 18-64	2.36	2.50	-0.15***	2.04	2.68	-0.65***	2.04	2.73	-0.70***	2.57	2.54	0.03
number of individuals >64	0.24	0.16	0.08***	0.40	0.22	0.19***	0.44	0.32	0.12***	0.23	0.20	0.03
vulnerable households												
female-headed hh	0.66	0.61	0.06***	0.30	0.32	-0.02	0.73	0.68	0.04***	0.52	0.43	0.09***
hh with unemployed	0.66	0.15	0.51***	0.64	0.20	0.44***	0.27	0.07	0.20***	0.19	0.03	0.16***
household with 3 or more children	0.24	0.06	0.17***	0.19	0.13	0.06***	0.14	0.12	0.02**	0.15	0.10	0.05***
hh with 5 or more members	0.30	0.20	0.10***	0.22	0.32	-0.10***	0.29	0.41	-0.12***	0.24	0.28	-0.04**
hh with disability recipient	0.73	0.62	0.11***	0.61	0.58	0.03**	0.72	0.62	0.11***	0.64	0.59	0.05**
hh with pensioner	0.24	0.18	0.06***	0.37	0.21	0.17***	0.47	0.30	0.17***	0.33	0.17	0.16***
hh with social aid	0.38	0.08	0.30***	0.16	0.01	0.15***	0.15	0.01	0.14***	-	-	-
location												
cities	0.27	0.47	-0.20***	0.23	0.33	-0.10***	0.32	0.33	-0.01	0.10	0.31	-0.21***
towns and suburbs	0.26	0.25	0.01	0.31	0.31	0.00	0.31	0.28	0.03***	0.36	0.26	0.09***
rural areas	0.47	0.28	0.19***	0.46	0.36	0.10***	0.37	0.39	-0.02*	0.54	0.43	0.11***

Note: Data is at the individual level and weighted using survey weights. Based on the LWI status of 2022. Columns (i) – (ii) report t-tests on the equality of means. *p < 0.1, ** p < 0.05, *** p < 0.01. Values reflect mean in observable characteristics, conditioning on living in a household with LWI or not. See Table 1 for a detailed definition of LWI. Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. LWI definition based on EU2030 target.

Table A3.4. Percentage of individuals deprived in each item of the material and social deprivation dimension by country (2022)

	Bulgaria	Croatia	Poland	Romania
Deprivations at the Household Level				
Capacity to face unexpected expenses	42.4	44.9	27.1	47.9
Capacity to afford paying for one week annual holiday	43.8	41.7	27.1	62.5
Capacity to being confronted with payment arrears	19.9	15.6	6.1	18.4
Capacity to afford a meal with meat, chicken, fish every second day	21.6	6.9	4.1	22.0
Ability to keep home adequately warm	22.5	7.0	4.8	15.1
Have access to a car/van for personal use	12.2	4.5	3.6	19.3
Replacing worn-out furniture	41.1	12.7	12.4	49.2
Deprivations at the Individual Level				
Having internet connection	8.6	1.4	0.9	9.5
Replacing worn-out clothes by some new ones	26.1	5.4	4.8	25.2
Having two pairs of properly fitting shoes	32.7	1.4	1.3	20.1
Spending a small amount of money each week on him/herself	23.6	7.7	8.9	35.6
Having regular leisure activities	17.8	2.8	9.1	32.2
Getting together with friends/family at least once a month	14.1	4.0	4.8	23.5

Note: Percentage of individuals (using survey weights). We follow Eurostat's criteria for the construction of material and social deprivation for children. Specifically, the same set of 13 items and thresholds are used for adults and children. However, because individual items are collected for people aged 16 or above, a child is considered deprived in an item if at least half of the adults in the household lack that item. As a result, adult items carry less weight in computing children's deprivation. Additionally, for a child to be considered materially and socially deprived, at least three of the deprivations must be household-level items out of the seven household deprivation items included in the list.

Source: Own estimates based on 2022 EU-SILC. We report the survey year and not the income year. Material and social deprivation definition based on EU2030 target.

Table A3.5. Cramer's V correlations across AROPE + dimensions, by country (2022)

	AROP	low work intensity	material and social deprivation +	education	health
Bulgaria					
AROP	1.00	0.41	0.38	0.35	0.10
low work intensity		1.00	0.34	0.29	0.17
material and social deprivation +			1.00	0.37	0.15
education				1.00	0.08
health					1.00
Croatia					
AROP	1.00	0.53	0.30	0.27	0.05
low work intensity		1.00	0.37	0.15	0.10
material and social deprivation +			1.00	0.15	0.12
education				1.00	0.05
health					1.00
Poland					
AROP	1.00	0.27	0.16	0.12	0.01
low work intensity		1.00	0.27	0.11	0.00
material and social deprivation +			1.00	0.07	0.09
education				1.00	0.02
health					1.00
Romania					
AROP	1.00	0.27	0.37	0.32	0.15
low work intensity		1.00	0.18	0.15	0.14
material and social deprivation +			1.00	0.31	0.28
education				1.00	0.20
health					1.00

Note: Data is at the individual level. All associations are significant at the 1% level. Note: Material and social deprivation + extends the material and social deprivation included in the AROPE to incorporate if the person lives in an overcrowded house (that is, if the average number of people per room available to the household is greater than two). A person is educationally deprived if at least one adult in the household has only attained primary education (or less). A person is deprived in health if at least one adult in the household has unmet needs for medical examination of treatment during the last twelve months.

Source: Correlations based on 2022 EU-SILC. We report the survey year, and not the income year.

Table A3.6. Profile of the Roma population, Bulgaria (2021)

	(i) Mean Roma	(ii) Mean non-Roma	(i) - (ii)
individual characteristics			
age	29.9	44.9	-15.0***
male	0.50	0.48	0.02
head of the household			
home ownership	0.73	0.86	-0.14***
primary education	0.86	0.16	0.70***
secondary education	0.12	0.54	-0.42***
tertiary education	0.02	0.30	-0.28***
employed	0.40	0.58	-0.19***
unemployed	0.23	0.07	0.17***
retired	0.10	0.29	-0.19***
inactive	0.27	0.05	0.21***
student	0.00	0.01	-0.01***
health: unmet medical needs	0.10	0.05	0.05***
housing: overcrowded house	0.35	0.03	0.33***
household structure			
number of individuals <18	2.00	0.65	1.35***
number of individuals 18-64	3.07	1.94	1.13***
number of individuals >64	0.16	0.46	-0.30***
vulnerable households			
female-headed hh	0.65	0.62	0.03***
hh with unemployed	0.49	0.14	0.35***
single-elderly hh	0.02	0.10	-0.08***
household with 3 or more children	0.31	0.03	0.28***
hh with 5 or more members	0.55	0.13	0.42***
hh with disability recipient	0.82	0.56	0.26***
hh with pensioner	0.19	0.43	-0.24***
hh with social aid	0.39	0.09	0.30***
location			
cities	0.26	0.46	-0.21***
towns and suburbs	0.34	0.23	0.11***
rural areas	0.40	0.30	0.10***

Note: Data is at the individual level and weighted using survey weights. Columns (i) – (ii) report t-tests on the equality of means. *p < 0.1, ** p < 0.05, *** p < 0.01. Values reflect mean in observable characteristics, conditioning on whether the individual belongs to the Roma population or not.

Source: Own estimates based on 2021 Bulgaria SILC. We report the survey year and not the income year.

Annex 4. Regression Analysis and Results

We perform a set of Probit regressions to explore the profile of the AROPE conditioning on several characteristics. We use four different dependent variables: 1) a binary variable indicating if the person is at risk of poverty (AROP), 2) a binary variable indicating if the person lives in a household with low work intensity (LWI), 3) a binary variable indicating if the person is materially and socially deprived (SMSD), and 4) a binary variable indicating if the person is at risk of poverty or social exclusion (AROPE). The specification of the Probit model is the following:

$$prob(p_i = 1|X_i) = F(X_i\beta) \qquad (1)$$

where $prob(p_i = 1|X_i)$ indicates the probability of each individual *i* of being AROP, LWI, SMSD or AROPE, respectively, and $F(X_i\beta)$ is the normal cumulative distribution function. X_i is the vector of individual, socio-economic and family control variables. Regarding individual and socio-economic variables, we include gender and the age of the individual, the education level of the household head (primary –reference category-, secondary or tertiary) and the labor status of the household head (employed –reference category-, unemployed, retired, inactive or student), and a variable indicating if the household head is the owner of the house. We also include an indicator variable if at least one adult in the household has unmet medical needs and if the individual lives in an overcrowded house (that is, if the average number of people per room available to the household is greater than two). Regarding family structure, we include the number of children (younger than 18), of adults under 65 years old and of adults 65+. We also include an indicator variable for each of the following vulnerable households: female-headed households, households with unemployed, single-elderly households, households with three or more children, households with five or more members, households with disability recipients, households with pensioners, and households receiving social aid. Lastly, we include location (if the person lives in a city –reference category-, in a town or suburbs or in a rural area) and regional variables (NUTS2 level).

We also perform a set of Probit regressions to explore the chronically poor and materially and socially deprived conditioning on several characteristics, and relying on the panel structure data of the EU-SILC. In this case, we use the following dependent variables: 1) a binary variable indicating if the person is at a persistent risk of poverty (persistent AROP), 2) a binary variable indicating if the person endures chronic material and social deprivations (persistent SMSD), and 3) a binary variable indicating if the person endures both persistent AROP and persistent SMSD. We use the same set of individual, socio-economic and family control variables, with the exception of the indicator variable if at least one adult in the household has unmet medical needs, because this information is not available in the panel data.

In this section we report the different regressions performed for each country. Estimations are run at the individual level using survey weights. We report the average marginal effects of each control variable in order to analyze changes in the probability of being AROP, LWI, SMSD and AROPE. Table A4.1 to Table A4.4 report results by country for the year 2022. Table A4.5 to Table A4.8 report a robustness analysis by country, using the survey year of 2021. Table A4.9 reports AROPE regressions for Bulgaria including the Roma population as a vulnerable group using the

survey year 2021. Lastly, Table A4.10 reports the regressions to understand chronic poverty and deprivations in Bulgaria using the survey year 2021.

Table A4.1. Average marginal effects of being deprived in each dimension, Bulgaria (2022)

	AROP	Low work intensity	Material and social deprivation	AROPE
male	-0.021***	-0.011***	-0.001***	-0.015**
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	0.000***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.046***	0.002***	-0.013***	-0.036**
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: secondary (ref.: primary)	-0.174***	-0.055***	-0.167***	-0.220***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: tertiary (ref.: primary)	-0.254**	-0.057***	-0.252***	-0.344***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: unemployed (ref.: employed)	0.076***	0.064***	0.027***	0.079***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: retired (ref.: employed)	0.100***	0.082***	0.040***	0.089***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: inactive (ref.: employed)	0.156***	0.203***	0.101***	0.235***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: student (ref.: employed)	0.057***	0.019***	0.142***	0.156***
	(0.002)	(0.001)	(0.002)	(0.002)
unmet medical needs	0.042***	0.049***	0.109***	0.083***
	(0.001)	(0.000)	(0.001)	(0.001)
overcrowded house	0.043***	0.038***	0.121***	0.097***
	(0.001)	(0.000)	(0.001)	(0.001)
number of individuals <18	0.075***	-0.003***	-0.012***	0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.032***	-0.020***	-0.024***	-0.056***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.040***	-0.010***	-0.012***	-0.044***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	0.014***	0.001***	0.025***	0.035***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.144***	0.094***	0.112***	0.199***
	(0.000)	(0.000)	(0.000)	(0.001)
single-elderly hh	0.225***	-	0.020***	0.186***
	(0.001)	-	(0.001)	(0.001)
hh with 3 or more children	0.037***	0.052***	0.126***	0.145***
	(0.001)	(0.001)	(0.001)	(0.001)
hh with 5 or more members	-0.047**	-0.070***	-0.002***	-0.024***
	(0.001)	(0.000)	(0.001)	(0.001)
hh with disability recipient	-0.082**	0.026***	-0.005***	-0.040***
	(0.000)	(0.000)	(0.000)	(0.001)
hh with pensioner	-0.056**	0.029***	-0.013***	-0.039***
	(0.001)	(0.000)	(0.001)	(0.001)
hh with social aid	0.074***	0.035***	0.102***	0.141***
	(0.000)	(0.000)	(0.000)	(0.001)
towns and suburbs (ref.: cities)	0.010***	-0.015***	0.002***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.013***	-0.003***	-0.014***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
Northern and Eastern (ref.: South-Western and South-Central)	-0.005**	-0.024***	-0.003***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.336	0.457	0.244	0.322

N	5,489,254	3,892,747	5,483,688	5,489,254

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2022. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2022 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.2. Average marginal effects of being deprived in each dimension, Croatia (2022)

	AROP	Low work intensity	Material and social deprivation	AROPE
male	-0.026***	-0.001**	-0.005***	-0.027***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	0.000***	0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.036***	-0.005***	-0.020***	-0.033***
	(0.001)	(0.000)	(0.000)	(0.001)
hh head: secondary (ref.: primary)	-0.134***	-0.030***	-0.036***	-0.130***
	(0.001)	(0.000)	(0.000)	(0.001)
hh head: tertiary (ref.: primary)	-0.233***	-0.039***	-0.057***	-0.232***
	(0.001)	(0.001)	(0.000)	(0.001)
hh head: unemployed (ref.: employed)	0.117***	0.090***	0.049***	0.126***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: retired (ref.: employed)	0.070***	0.125***	0.031***	0.090***
	(0.001)	(0.001)	(0.000)	(0.001)
hh head: inactive (ref.: employed)	0.307***	0.191***	0.065***	0.309***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: student (ref.: employed)	0.177***	0.084***	0.000	0.234***
	(0.007)	(0.005)	(0.000)	(0.008)
unmet medical needs	0.028***	0.042***	0.042***	0.052***
	(0.001)	(0.000)	(0.000)	(0.001)
overcrowded house	-0.050***	-0.035***	0.028***	-0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
number of individuals <18	-0.022***	-0.016***	-0.006***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.109***	-0.048***	-0.025***	-0.112***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.073***	-0.028***	-0.033***	-0.086***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	-0.052***	-0.036***	-0.004***	-0.044***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.193***	0.082***	0.041***	0.207***
	(0.001)	(0.000)	(0.000)	(0.001)
single-elderly hh	0.067***	-	-0.009***	0.065***
	(0.001)	-	(0.000)	(0.001)
hh with 3 or more children	0.053***	0.090***	-0.005***	0.066***
	(0.001)	(0.001)	(0.001)	(0.001)
hh with 5 or more members	0.089***	-0.028***	0.032***	0.085***
	(0.001)	(0.001)	(0.000)	(0.001)
hh with disability recipient	0.024***	0.039***	0.010***	0.026***
	(0.001)	(0.000)	(0.000)	(0.001)
hh with pensioner	0.009***	0.010***	0.005***	0.021***
	(0.001)	(0.000)	(0.000)	(0.001)
hh with social aid	0.096***	0.067***	0.068***	0.164***
	(0.001)	(0.001)	(0.000)	(0.001)
towns and suburbs (ref.: cities)	0.031***	-0.003***	0.004***	0.029***
	(0.001)	(0.000)	(0.000)	(0.001)
rural areas (ref.: cities)	0.069***	0.008***	0.001***	0.060***
	(0.000)	(0.000)	(0.000)	(0.001)

Pseudo-R2	0.308	0.446	0.257	0.296
N	3,109,768	2,112,247	3,073,896	3,109,768

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2022. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2022 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.3. Average marginal effects of being deprived in each dimension, Poland (2022)

	AROP	Low work intensity	Material and social deprivation	AROPE
male	-0.003***	-0.005***	-0.003***	-0.007***
	(0.000)	(0.000)	(0.000)	(0.000)
age	-0.000***	0.000***	0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.029***	-0.015***	-0.025***	-0.049***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: secondary (ref.: primary)	-0.068***	-0.033***	-0.029***	-0.075***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: tertiary (ref.: primary)	-0.161***	-0.048***	-0.049***	-0.184***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: unemployed (ref.: employed)	0.060***	0.020***	0.011***	0.057***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: retired (ref.: employed)	-0.028***	0.039***	0.003***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: inactive (ref.: employed)	0.064***	0.102***	0.028***	0.106***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: student (ref.: employed)	0.217***	0.183***	0.014***	0.226***
	(0.001)	(0.001)	(0.001)	(0.001)
unmet medical needs	0.001***	-0.005***	0.031***	0.013***
	(0.000)	(0.000)	(0.000)	(0.000)
overcrowded house	-0.023***	0.010***	0.010***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals <18	-0.005***	-0.034***	-0.007***	-0.024***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.024***	-0.035***	-0.018***	-0.031***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.038***	-0.031***	-0.026***	-0.045***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	-0.002***	-0.004***	0.004***	0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.102***	0.041***	0.030***	0.129***
	(0.000)	(0.000)	(0.000)	(0.000)
single-elderly hh	0.151***	-	-0.005***	0.136***
	(0.000)	-	(0.000)	(0.000)
hh with 3 or more children	0.034***	0.035***	-0.024***	0.059***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with 5 or more members	0.024***	0.029***	0.022***	0.018***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with disability recipient	-0.001***	0.049***	0.012***	0.041***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with pensioner	0.003***	0.043***	0.009***	0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with social aid	0.084***	0.059***	0.043***	0.114***
	(0.000)	(0.000)	(0.000)	(0.000)
towns and suburbs (ref.: cities)	0.034***	0.001***	0.009***	0.032***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.110***	0.001***	0.002***	0.107***

	(0.000)	(0.000)	(0.000)	(0.000)
South Macroregion (ref.: Masovian)	0.003***	0.009***	-0.005***	0.013***
	(0.000)	(0.000)	(0.000)	(0.000)
North-west Macroregion	0.028***	0.005***	-0.007***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)
South-west Macroregion	-0.016***	0.015***	-0.012***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
North Macroregion	0.029***	0.012***	-0.005***	0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
Central Macroregion	0.023***	0.018***	0.002***	0.037***
	(0.000)	(0.000)	(0.000)	(0.000)
East Macroregion	0.065***	0.029***	-0.003***	0.075***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.140	0.431	0.208	0.144
N	29,280,695	21,780,830	24,556,173	29,280,695

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2022. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2022 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.4. Average marginal effects of being deprived in each dimension, Romania (2022)

	AROP	Low work intensity	Material and social deprivation	AROPE
male	-0.014***	-0.010***	-0.006***	-0.018***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	-0.000***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	0.026***	0.010***	-0.061***	-0.057***
	(0.000)	(0.000)	(0.000)	(0.001)
hh head: secondary (ref.: primary)	-0.209***	-0.050***	-0.179***	-0.260***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: tertiary (ref.: primary)	-0.311***	-0.062***	-0.325***	-0.459***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: unemployed (ref.: employed)	0.068***	0.055***	0.082***	0.253***
	(0.001)	(0.001)	(0.001)	(0.002)
hh head: retired (ref.: employed)	0.063***	0.068***	0.056***	0.107***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: inactive (ref.: employed)	0.260***	0.194***	0.130***	0.215***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: student (ref.: employed)	0.278***	-	-0.034***	0.197***
	(0.001)	-	(0.001)	(0.001)
unmet medical needs	0.054***	0.018***	0.201***	0.187***
	(0.000)	(0.000)	(0.000)	(0.000)
overcrowded house	-0.050***	0.019***	0.131***	0.027***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals <18	-0.017***	-0.004***	0.037***	0.046***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.023***	-0.001***	-0.024***	-0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.091***	-0.027***	-0.075***	-0.096***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	-0.045***	-0.040***	-0.018***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.174***	0.052***	0.191***	0.263***
	(0.001)	(0.000)	(0.001)	(0.001)
single-elderly hh	0.081***	0.000	-0.008***	0.044***
	(0.000)	(0.000)	(0.000)	(0.000)

hh with 3 or more children	0.068***	0.035***	0.065***	0.053***
	(0.000)	(0.000)	(0.000)	(0.001)
hh with 5 or more members	0.052***	-0.068***	0.030***	0.035***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with disability recipient	0.022***	0.013***	-0.044***	-0.052***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with pensioner	-0.057***	0.032***	0.005***	-0.040***
	(0.000)	(0.000)	(0.000)	(0.000)
towns and suburbs (ref.: cities)	0.088***	0.006***	-0.021***	0.017***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.134***	0.011***	0.009***	0.072***
	(0.000)	(0.000)	(0.000)	(0.000)
Northwest (ref.: Southwest)	-0.086***	-0.002***	-0.011***	-0.060***
	(0.000)	(0.000)	(0.000)	(0.000)
Northeast	-0.030***	-0.002***	-0.000	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
South	-0.075***	-0.005***	0.038***	-0.010***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.295	0.467	0.225	0.259
N	14,579,816	10,377,251	14,552,697	14,579,816

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2022. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2022 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.5. Average marginal effects of being deprived in each dimension, Bulgaria (2021)

	AROP	**Low work intensity**	**Material and social deprivation**	**AROPE**
male	-0.014***	-0.012***	-0.004***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	0.000**	0.001***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	0.005***	0.002***	-0.041***	-0.019***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: secondary (ref.: primary)	-0.148***	-0.043***	-0.156***	-0.205***
	(0.000)	(0.000)	(0.001)	(0.001)
hh head: tertiary (ref.: primary)	-0.215***	-0.039***	-0.236***	-0.313***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: unemployed (ref.: employed)	0.035***	0.041***	0.078***	0.112***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: retired (ref.: employed)	0.111***	0.074***	0.045***	0.114***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: inactive (ref.: employed)	0.176***	0.174***	0.098***	0.223***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: student (ref.: employed)	0.140***	0.054***	-0.039***	0.127***
	(0.003)	(0.002)	(0.002)	(0.003)
unmet medical needs	0.065***	0.019***	0.128***	0.114***
	(0.001)	(0.000)	(0.001)	(0.001)
overcrowded house	0.114***	0.060***	0.146***	0.157***
	(0.001)	(0.000)	(0.001)	(0.001)
number of individuals <18	0.032***	-0.005***	-0.013***	0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.043***	-0.040***	-0.046***	-0.072***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	0.008***	-0.028***	-0.032***	-0.029***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	-0.001***	-0.005***	0.028***	0.023***

	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.130***	0.092***	0.104***	0.160***
	(0.000)	(0.000)	(0.000)	(0.001)
single-elderly hh	0.186***		0.002***	0.128***
	(0.001)		(0.001)	(0.001)
hh with 3 or more children	0.051***	0.027***	0.128***	0.125***
	(0.001)	(0.001)	(0.001)	(0.001)
hh with 5 or more members	-0.017***	-0.017***	-0.010***	-0.011***
	(0.001)	(0.000)	(0.001)	(0.001)
hh with disability recipient	-0.046***	0.017***	0.010***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with pensioner	-0.123***	0.031***	-0.003***	-0.071***
	(0.001)	(0.000)	(0.000)	(0.001)
hh with social aid	0.063***	0.077***	0.094***	0.138***
	(0.000)	(0.000)	(0.000)	(0.001)
towns and suburbs (ref.: cities)	0.008***	-0.017***	0.001**	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.043***	0.011***	0.002***	0.032***
	(0.000)	(0.000)	(0.000)	(0.000)
Northern and Eastern (ref.: South-Western and South-Central)	-0.006***	-0.010***	0.010***	0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.261	0.415	0.242	0.279
N	5,472,772	3,851,851	5,466,472	5,472,772

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2021. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2021 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.6. Average marginal effects of being deprived in each dimension, Croatia (2021)

	AROP	**Low work intensity**	**Material and social deprivation**	**AROPE**
male	-0.021***	-0.008***	-0.007***	-0.029***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.001***	0.000	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.044***	-0.011***	-0.024***	-0.048***
	(0.001)	(0.000)	(0.000)	(0.001)
hh head: secondary (ref.: primary)	-0.149***	-0.023***	-0.037***	-0.153***
	(0.001)	(0.000)	(0.000)	(0.001)
hh head: tertiary (ref.: primary)	-0.249***	-0.049***	-0.053***	-0.248***
	(0.001)	(0.000)	(0.000)	(0.001)
hh head: unemployed (ref.: employed)	0.118***	0.100***	0.052***	0.144***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: retired (ref.: employed)	0.107***	0.172***	0.013***	0.127***
	(0.001)	(0.001)	(0.000)	(0.001)
hh head: inactive (ref.: employed)	0.215***	0.182***	0.093***	0.239***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: student (ref.: employed)	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
unmet medical needs	0.042***	0.020***	0.039***	0.055***
	(0.001)	(0.000)	(0.000)	(0.001)
overcrowded house	0.024***	-0.029***	0.017***	0.029***
	(0.001)	(0.001)	(0.001)	(0.001)
number of individuals <18	-0.014***	-0.030***	-0.005***	-0.017***

	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.080***	-0.055***	-0.025***	-0.084***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.071***	-0.030***	-0.024***	-0.071***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	-0.013***	-0.003***	0.004***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.186***	0.096***	0.030***	0.198***
	(0.001)	(0.000)	(0.000)	(0.001)
single-elderly hh	0.066***		-0.025***	0.056***
	(0.001)		(0.000)	(0.001)
hh with 3 or more children	0.089***	0.062***	0.007***	0.106***
	(0.001)	(0.001)	(0.001)	(0.001)
hh with 5 or more members	0.083***	0.032***	-0.001	0.063***
	(0.001)	(0.001)	(0.001)	(0.001)
hh with disability recipient	-0.001	0.037***	0.020***	0.006***
	(0.001)	(0.000)	(0.000)	(0.001)
hh with pensioner	-0.000	-0.010***	0.008***	0.005***
	(0.001)	(0.000)	(0.000)	(0.001)
hh with social aid	0.036***	0.077***	0.034***	0.066***
	(0.001)	(0.000)	(0.000)	(0.001)
towns and suburbs (ref.: cities)	0.028***	0.006***	0.005***	0.025***
	(0.001)	(0.000)	(0.000)	(0.001)
rural areas (ref.: cities)	0.076***	0.028***	0.009***	0.073***
	(0.001)	(0.000)	(0.000)	(0.001)
Pseudo-R2	0.273	0.447	0.253	0.271
N	3,079,893	2,108,703	3,059,218	3,079,893

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2021. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2021 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.7. Average marginal effects of being deprived in each dimension, Poland (2021)

	AROP	**Low work intensity**	**Material and social deprivation**	**AROPE**
male	-0.003***	-0.005***	-0.001***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	-0.000***	0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.026***	-0.011***	-0.022***	-0.035***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: secondary (ref.: primary)	-0.059***	-0.021***	-0.028***	-0.074***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: tertiary (ref.: primary)	-0.162***	-0.031***	-0.049***	-0.188***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: unemployed (ref.: employed)	0.028***	0.025***	0.003***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: retired (ref.: employed)	0.003***	0.035***	0.009***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: inactive (ref.: employed)	0.084***	0.121***	0.025***	0.122***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: student (ref.: employed)	0.157***	0.029***	0.000	0.163***
	(0.001)	(0.001)	(0.000)	(0.001)
unmet medical needs	0.040***	0.008***	0.033***	0.054***
	(0.000)	(0.000)	(0.000)	(0.000)

overcrowded house	0.009***	-0.014***	0.013***	-0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals <18	0.004***	-0.037***	-0.009***	-0.025***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.026***	-0.033***	-0.014***	-0.032***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.052***	-0.025***	-0.018***	-0.053***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	0.010***	-0.013***	0.011***	0.013***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.107***	0.053***	0.041***	0.129***
	(0.000)	(0.000)	(0.000)	(0.000)
single-elderly hh	0.141***		-0.006***	0.132***
	(0.000)		(0.000)	(0.000)
hh with 3 or more children	0.043***	0.044***	-0.021***	0.082***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with 5 or more members	0.027***	0.015***	0.025***	0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with disability recipient	-0.011***	0.051***	0.005***	0.044***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with pensioner	0.016***	0.046***	-0.009***	0.031***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with social aid	0.109***	0.064***	0.043***	0.162***
	(0.000)	(0.000)	(0.000)	(0.000)
towns and suburbs (ref.: cities)	0.036***	-0.003***	-0.002***	0.020***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.108***	0.005***	0.006***	0.101***
	(0.000)	(0.000)	(0.000)	(0.000)
South Macroregion (ref.: Masovian)	-0.013***	0.019***	0.003***	-0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
North-west Macroregion	-0.019***	0.020***	-0.006***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
South-west Macroregion	-0.042***	0.009***	0.002***	-0.026***
	(0.000)	(0.000)	(0.000)	(0.000)
North Macroregion	-0.007***	0.024***	-0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Central Macroregion	-0.012***	0.012***	0.001***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
East Macroregion	0.032***	0.018***	-0.002***	0.036***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.140	0.474	0.213	0.148
N	28,977,345	21,478,959	24,715,369	28,977,345

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2021. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2021 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.8. Average marginal effects of being deprived in each dimension, Romania (2021)

	AROP	Low work intensity	Material and social deprivation	AROPE
male	-0.026***	-0.011***	-0.021***	-0.039***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	-0.000***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.067***	-0.018***	-0.048***	-0.076***
	(0.000)	(0.000)	(0.000)	(0.001)

hh head: secondary (ref.: primary)	-0.222***	-0.033***	-0.220***	-0.262***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: tertiary (ref.: primary)	-0.364***	-0.049***	-0.353***	-0.481***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: unemployed (ref.: employed)	0.043***	0.182***	-0.023***	0.050***
	(0.001)	(0.001)	(0.001)	(0.002)
hh head: retired (ref.: employed)	0.055***	0.065***	0.027***	0.070***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: inactive (ref.: employed)	0.159***	0.173***	0.145***	0.196***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: student (ref.: employed)	0.439***	0.129***	-0.040***	0.383***
	(0.001)	(0.002)	(0.001)	(0.001)
unmet medical needs	0.034***	0.010***	0.107***	0.103***
	(0.000)	(0.000)	(0.000)	(0.000)
overcrowded house	0.041***	0.050***	0.080***	0.106***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals <18	0.052***	-0.018***	-0.026***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.051***	-0.011***	-0.036***	-0.054***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	-0.064***	-0.027***	-0.063***	-0.084***
	(0.000)	(0.000)	(0.000)	(0.000)
female headed hh	-0.068***	-0.032***	-0.027***	-0.047***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.175***	0.044***	0.182***	0.218***
	(0.000)	(0.000)	(0.001)	(0.001)
single-elderly hh	0.021***		0.001***	0.021***
	(0.000)		(0.000)	(0.000)
hh with 3 or more children	-0.012***	0.044***	0.153***	0.124***
	(0.000)	(0.000)	(0.001)	(0.001)
hh with 5 or more members	0.039***	-0.039***	0.048***	0.027***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with disability recipient	-0.075***	0.030***	0.040***	-0.033***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with pensioner	-0.110***	0.030***	-0.030***	-0.064***
	(0.000)	(0.000)	(0.000)	(0.000)
towns and suburbs (ref.: cities)	0.087***	0.002***	0.011***	0.051***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.186***	0.013***	0.056***	0.134***
	(0.000)	(0.000)	(0.000)	(0.000)
Northwest (ref.: Southwest)	-0.103***	-0.010***	-0.004***	-0.076***
	(0.000)	(0.000)	(0.000)	(0.000)
Northeast	-0.007***	-0.014***	0.046***	0.029***
	(0.000)	(0.000)	(0.000)	(0.000)
South	-0.087***	-0.022***	0.025***	-0.039***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.332	0.394	0.194	0.267
N	15,848,721	11,395,689	15,820,324	15,848,721

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2021. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2021 EU-SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.9. Average marginal effects of being deprived in each dimension, Roma (2021)

	AROP	Low work intensity	Material and social deprivation	AROPE

male	-0.014***	-0.012***	-0.004***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
age	0.000***	0.000***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: home ownership	0.008***	0.004***	-0.037***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
hh head: secondary (ref.: primary)	-0.114***	-0.032***	-0.111***	-0.158***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: tertiary (ref.: primary)	-0.181***	-0.026***	-0.192***	-0.264***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: unemployed (ref.: employed)	0.038***	0.042***	0.084***	0.116***
	(0.001)	(0.000)	(0.001)	(0.001)
hh head: retired (ref.: employed)	0.111***	0.076***	0.045***	0.115***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: inactive (ref.: employed)	0.156***	0.167***	0.074***	0.200***
	(0.001)	(0.001)	(0.001)	(0.001)
hh head: student (ref.: employed)	0.152***	0.064***	-0.022***	0.144***
	(0.003)	(0.002)	(0.002)	(0.003)
unmet medical needs	0.061***	0.016***	0.125***	0.109***
	(0.001)	(0.000)	(0.001)	(0.001)
overcrowded house	0.079***	0.051***	0.108***	0.114***
	(0.001)	(0.000)	(0.001)	(0.001)
number of individuals <18	0.030***	-0.005***	-0.017***	0.010***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.041***	-0.040***	-0.044***	-0.069***
	(0.000)	(0.000)	(0.000)	(0.000)
number of individuals >64	0.013***	-0.025***	-0.026***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
Roma	**0.106*** **	**0.029*** **	**0.128*** **	**0.159*** **
	(0.001)	**(0.000)**	**(0.001)**	**(0.001)**
female headed hh	-0.002***	-0.006***	0.028***	0.022***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with unemployed	0.121***	0.089***	0.090***	0.147***
	(0.000)	(0.000)	(0.000)	(0.001)
single-elderly hh	0.187***	-	0.006***	0.129***
	(0.001)	-	(0.001)	(0.001)
hh with 3 or more children	0.046***	0.026***	0.127***	0.111***
	(0.001)	(0.001)	(0.001)	(0.001)
hh with 5 or more members	-0.022***	-0.015***	-0.013***	-0.018***
	(0.001)	(0.000)	(0.001)	(0.001)
hh with disability recipient	-0.044***	0.017***	0.012***	-0.013***
	(0.000)	(0.000)	(0.000)	(0.000)
hh with pensioner	-0.123***	0.030***	-0.004***	-0.072***
	(0.001)	(0.000)	(0.000)	(0.001)
hh with social aid	0.052***	0.074***	0.082***	0.124***
	(0.000)	(0.000)	(0.000)	(0.001)
towns and suburbs (ref.: cities)	-0.000	-0.020***	-0.007***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.042***	0.012***	0.003***	0.032***
	(0.000)	(0.000)	(0.000)	(0.000)
Northern and Eastern (ref.: South-Western and South-Central)	-0.001***	-0.007***	0.016***	0.016***
	(0.000)	(0.000)	(0.000)	(0.000)
Pseudo-R2	0.268	0.419	0.256	0.288
N	5,472,772	3,851,851	5,466,472	5,472,772

Note: Data is at the individual level and weighted accordingly using survey weights. Based on AROPE status of 2021. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.
Source: Own estimates based on 2021 Bulgaria SILC. We report the survey year, and not the income year. AROPE definition based on EU2030 target.

Table A4.10. Average marginal effects of persistent AROP and persistent SMSD, Bulgaria (2021)

	Persistent AROP	Persistent SMSD	Persistent AROP and SMSD
male	-0.013***	-0.004***	0.002***
	(0.000)	(0.000)	(0.000)
age	0.000***	0.001***	0.000***
	(0.000)	(0.000)	(0.000)
hh head: home ownership	-0.036***	-0.038***	-0.033***
	(0.000)	(0.000)	(0.000)
hh head: secondary (ref.: primary)	-0.122***	-0.101***	-0.075***
	(0.000)	(0.000)	(0.000)
hh head: tertiary (ref.: primary)	-0.188***	-0.171***	-0.111***
	(0.000)	(0.000)	(0.000)
hh head: unemployed (ref.: employed)	0.017***	0.031***	0.021***
	(0.000)	(0.001)	(0.000)
hh head: retired (ref.: employed)	0.061***	0.047***	0.035***
	(0.000)	(0.000)	(0.000)
hh head: inactive (ref.: employed)	0.098***	0.081***	0.062***
	(0.001)	(0.001)	(0.000)
hh head: student (ref.: employed)	0.122***	-	-
	(0.002)	-	-
overcrowded house	0.015***	0.075***	-0.016***
	(0.000)	(0.001)	(0.000)
number of individuals <18	0.038***	-0.009***	0.012***
	(0.000)	(0.000)	(0.000)
number of individuals 18-64	-0.031***	-0.039***	-0.023***
	(0.000)	(0.000)	(0.000)
number of individuals >64	0.033***	-0.011***	0.008***
	(0.000)	(0.000)	(0.000)
Roma	0.093***	0.164***	0.080***
	(0.000)	(0.000)	(0.000)
female headed hh	0.015***	0.028***	0.011***
	(0.000)	(0.000)	(0.000)
hh with unemployed	0.122***	0.106***	0.078***
	(0.000)	(0.000)	(0.000)
single-elderly hh	0.167***	0.020***	0.073***
	(0.000)	(0.000)	(0.000)
hh with 3 or more children	0.025***	0.007***	0.006***
	(0.001)	(0.001)	(0.001)
hh with 5 or more members	0.011***	0.006***	0.046***
	(0.000)	(0.000)	(0.000)
hh with disability recipient	-0.043***	-0.004***	-0.029***
	(0.000)	(0.000)	(0.000)
hh with pensioner	-0.109***	-0.049***	-0.060***
	(0.000)	(0.000)	(0.000)
hh with social aid	0.102***	0.108***	0.062***
	(0.000)	(0.000)	(0.000)
towns and suburbs (ref.: cities)	-0.014***	-0.006***	-0.016***
	(0.000)	(0.000)	(0.000)
rural areas (ref.: cities)	0.002***	0.015***	-0.006***
	(0.000)	(0.000)	(0.000)

Northern and Eastern (ref.: South-Western and South-Central)	0.015*** (0.000)	0.020*** (0.000)	0.007*** (0.000)
Pseudo-R2	0.364	0.277	0.392
N	6,596,813	6,571,677	6,571,677

Note: Data is at the individual level and weighted accordingly using survey weights. A person is at a persistent risk of poverty (or endures persistent material and social deprivation) if is at risk of poverty (or endures persistent social material deprivation) in the current year and in at least two out of three preceding years. Employment status based on 2021 information. Robust standard errors in parentheses. *p < 0.1, ** p < 0.05, *** p < 0.01.

Source: Own estimates based on 2021 Panel EU-SILC. We report the survey year, and not the income year. Severe material and social deprivation definition based on EU2030 target.