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A Study on Multidimensional Poverty in Türkiye from a Regional Perspective*

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Abstract

The multidimensional poverty approach considering the intrinsically multifaceted structure of the poverty phenomenon has become prevalent recently. This study produces a multidimensional poverty index (MPI) -composed of education, health, housing conditions, material deprivation, and social exclusion dimensions- for Türkiye. For this purpose, it applies the Alkire-Foster methodology and employs the SILC micro datasets for the 2014-2022 period. Türkiye is a rather heterogeneous country and therefore the current study has a special focus on the spatial distribution of poverty in the country. It is found that multidimensional poverty is mainly concentrated in Southeastern and Eastern Anatolia. Although multidimensional poverty fell in all regions without exception from 2014 to 2022, the regions with the highest poverty did not change in this period. Afterwards, a comprehensive descriptive analysis is provided including many scatter plots for regional MPIs and regional macroeconomic and social indicators to clarify the association between regional poverty and regional conditions.

JEL Codes: I32, O11, O12, O18, R11

Keywords: poverty measurement, multidimensional poverty, regional poverty, regional development

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Türkiye'deki Çok Boyutlu Yoksulluk Üzerine Bölgesel Perspektiften Bir Çalışma

Öz

Yoksulluk olgusunun doğası gereği çok yönlü olan yapısını dikkate alan çok boyutlu yoksulluk yaklaşımı son yıllarda yaygın hâle gelmiştir. Bu çalışma Türkiye için eğitim, sağlık, barınma koşulları, maddi yoksunluk ve sosyal dışlanma boyutlarından oluşan bir çok boyutlu yoksulluk endeksi geliştirmektedir. Bu amaçla Alkire-Foster metodolojisi uygulanmakta ve 2014-2022 dönemine ait GYKA mikro veri setleri kullanılmaktadır. Türkiye'nin heterojen yapısı nedeniyle bu çalışma yoksulluğun ülke içindeki mekânsal dağılımına özel olarak odaklanmaktadır. Sonuçlar çok boyutlu yoksulluğun ağırlıklı olarak Güneydoğu ve Doğu Anadolu bölgelerinde yoğunlaştığını göstermektedir. 2014'ten 2022'ye kadar çok boyutlu yoksulluk istisnasız olarak her bölgede azalmış olsa da en yoksul bölgeler bu dönemde değişmemiştir. Sonrasında, bölgesel yoksulluk ile bölgesel koşullar arasındaki ilişkileri açıklığa kavuşturmak için bölgesel çok boyutlu yoksulluk endeksleri ile bölgesel makroekonomik ve sosyal göstergelere ilişkin çok sayıda grafiği içeren kapsamlı bir betimsel analiz sunulmaktadır.

JEL Kodları: I32, O11, O12, O18, R11

Anahtar Kelimeler: yoksulluk ölçümü, çok boyutlu yoksulluk, bölgesel yoksulluk, bölgesel gelişme

1. Introduction

Poverty has been one of the most fundamental economic, social, and political challenges globally for centuries. It is considered as not only a lack of economic and material resources but also a violation of human rights. It impairs economic and social rights such as access to food and clean water, the right to education and health, and also civil and political rights. In spite of the great efforts made by governments and non-governmental organizations, poverty is still one of the main challenges faced by many countries in our time. Besides, the progress in poverty alleviation is rather vulnerable to shocks as the recent shocks (e.g., the COVID-19 pandemic and climate change) have demonstrated.

To handle poverty, the primary step is to measure it as accurately as possible. Poverty statistics are very crucial economic and social indicators because they allow us to monitor how economic development evolves. Moreover, poverty comparisons can unearth which groups, regions and countries are more prone to poverty. Poverty measurement is therefore a useful tool to target the poorest groups and regions, allocate social budgets, and support the coordination of social policies. Poverty statistics raise public awareness and motivate politicians to handle this problem since the prevalence of poverty means policy failure (Atkinson, 2019). Yet, there is no consensus on how to measure poverty and poverty estimations can notably differ depending on the methodology (Atkinson, 1987). Measurement of poverty has always been a challenging task as the results are often sensitive to the choice of welfare indicator, poverty line, and summary statistic.

Absolute and relative poverty concepts have been prominent in poverty measurement for decades. They both use monetary sources, such as household income level or consumption expenditures as welfare indicators. Then, by employing a pre-determined poverty line, these approaches identify individuals or households as poor if their welfare level is lower than this threshold. However, monetary welfare indicators suffer from some limitations. For example, household income level is highly affected by transitory income, and in this case, it is not a proper indicator for long-term welfare. Furthermore, the collection of income data may be problematic if informal employment, agricultural or self-employment are prevalent (World Bank, 2005). Both income and consumption data suffer from recall bias. The collection of monetary data suffers from measurement error more probably than that of non-monetary indicators of welfare such as educational degree or having an indoor toilet. More importantly, although monetary resources enable access to plenty of market goods, they may not help access to non-market goods such as education or health services (Ravallion, 2012). For example, the household income of a child who does not attend school might be above the monetary poverty line (Limanlı, 2016). Therefore, monetary resources might lack to reflect well-being, and deprivation forms other than economic hardship can be important for poverty

measurement (Smeeding, 2016). Non-monetary indicators of welfare are useful for comprehending the multifaceted structure of poverty.

To deal with these limitations, the multidimensional poverty approach has come to the fore recently. This literature argues that poverty is a multifaceted phenomenon which is intrinsically multidimensional (Alkire and Foster, 2007, 2011; Nolan and Whelan, 2010, 2014; Alkire et al. 2015). To focus only on the lack of monetary or non-monetary deprivations may not be sufficient to measure poverty. Poverty is sometimes a lack of food; sometimes psychological issues (e.g., humiliation, voicelessness, dependency, powerlessness); and sometimes a lack of access to basic infrastructure like clean water and transportation (Alkire et al., 2015). By comparing country trajectories in satisfying the Millennium Development Goals and reductions in income poverty, Alkire et al. (2015) conclude that trends in income poverty do not always match with non-income deprivations, and therefore monetary poverty measures should be complemented by other dimensions of poverty. They also state that no single non-monetary deprivation represents all the other deprivations. Therefore, a multidimensional measure must reflect highly differentiated dimensions of deprivations.

In this context, the Human Development Index (HDI), a summary measure of education, health, and a decent living standard, has been estimated by the United Nations Development Programme (UNDP) since 1990. Moreover, the Human Poverty Index (HPI) used for international poverty comparisons was introduced by the UNDP in 1997. This index, which has different definitions for developing countries and high-income OECD group, consists of three dimensions; a long and healthy life, knowledge (measured by illiteracy rates), and a decent standard of living. The HPI was replaced by the global MPI in 2010. An MPI can reflect highly differentiated deprivations of the people in poverty. It considers overlapping or simultaneous deprivations that individuals experience. Taking various components of welfare into account allows for analysing the phenomenon of poverty comprehensively beyond the lack of monetary resources. Oxford Poverty and Human Development Initiative (OPHI) and UNDP measure the global Multidimensional Poverty Index (MPI) for more than 100 countries. The global MPI consists of three dimensions; health, education, and living standards. As Acar (2014) argues, the global MPI is more proper for underdeveloped countries since its criteria is too low for developing ones. Therefore, several developing countries, such as India, Mexico, Colombia, Chile, Thailand, etc., have generated official and national (i.e., country-specific) MPIs by considering the characteristics of their own country recently. A national MPI allows for monitoring progress in multidimensional poverty, coordination of policies, budget allocations and planning, guiding policy interventions, targeting, and impact evaluation.

Following the previous discussion on the importance of poverty as an economic and social challenge and the advantages of multidimensional poverty measurement, this study aims to provide a comprehensive descriptive analysis about regional disparities in

poverty in Türkiye using multidimensional poverty indices. Türkiye is an important study area because of the persistent regional duality within the country (see for example Erkal, 1978). Indeed, there is a great literature on the prevalence of regional imbalances in the country. For instance, Dansuk, Özmen, and Erdoğan (2007) showed that income and social classes were unequally distributed among regions in Türkiye. Many studies concluded that there is a considerable disparity between the Eastern and Western parts of Türkiye in terms of wages (Taştan and Akar, 2013), incomes (Filiztekin and Çelik, 2010), economic activity and poor access to education and health facilities (Karaman and Doğruel, 2011), and market potential (Karahasan, Doğruel, Doğruel, 2016). Moreover, some studies found that poverty in Türkiye was spatially clustered in South-eastern and Eastern Anatolia (Karadağ, 2010; Coşkun, 2012; Duran, 2015; Karadağ, 2015; Limanlı, 2016; Karahasan and Bilgel, 2021). These studies mostly argued that regional concentration of poverty was not a temporary issue changing over time, but a structural problem. Therefore, it is important to consider the regional disparities and conduct poverty-related analysis at the regional level.

Although there is not an official MPI in Türkiye, a few studies in the literature constructed multidimensional indices for the country (Acar, 2014; Karadağ and Saraçoğlu, 2015; Limanlı, 2016; Giovanis and Özdamar, 2021; Karahasan and Bilgel, 2021; Yılmaz and Kılıç, 2021 and Tekgüç and Akbulut, 2022). While most of the previous studies focus on the population over 14-year-old, the MPI in the current study accounts for the whole population. Besides, it employs a few new indicators (e.g., internet access and overcrowding) and a new dimension (i.e., social exclusion). Finally, and foremost, this paper extends the prior literature by measuring regional MPI in Türkiye by focusing on its spatial distribution and puts forward a detailed understanding of its nature on the basis of regional disparities by employing useful descriptive analysis.

In this study, the Surveys of Income and Living Conditions (SILC) between 2014 and 2022 are used and an extensive descriptive analysis is conducted. The descriptive analysis consists of three parts. First, regional MPIs between 2014 and 2022 are estimated at the NUTS-2 level and compared. Second, regional MPIs are decomposed to examine the differences in the contribution of each dimension across regions. Third, various scatter plots for regional MPIs and regional macroeconomic and social indicators (sectoral GDP per capita, unemployment rate, share of exports and imports in GDP, credits per adult, per capita social assistance, Gini index, female labor force participation rate, early motherhood rate, net migration rate and the number of students per teacher) are drawn to clarify the association between regional poverty and regional conditions.

The rest of the paper is organized as follows. Section 2 describes the data used and explains the methodological details of MPI measurement. Section 3 presents the descriptive tables and figures to discuss the regional disparities in MPI. Section 4 concludes along with some policy recommendations.

2. Data and methodology

The Alkire-Foster (AF) (2007, 2011) methodology is followed to measure the MPI generated in this study. This approach satisfies many desirable axioms and also has intuitive power. Its practical and technical advantages make it quite attractive to informing policy. It employs the Adjusted Headcount Ratio as the multidimensional poverty index reflecting both the incidence and intensity of poverty. The AF method follows a dual cut-off approach: (i) a set of deprivation cut-offs identifying if an individual/household is deprived in each indicator, (ii) a poverty cut-off identifying if an individual/household is multidimensionally poor or not. The steps of this methodology are as follows (Alkire et al., 2015, pp. 145-147).

i. A set of indicators are defined. Data for all units of identification (i.e., individuals or households) needs to be available for all units.

ii. Deprivation cut-offs (i.e., thresholds considered adequate to be non-deprived) for each indicator should be set.

iii. Cut-offs are applied to decide whether each individual/household is deprived or not in terms of each indicator.

iv. Weights for each indicator are chosen such that their sum is equal to one. Here, we adopt the equal weighting approach where dimensions are equally weighted and indicators in each dimension are also equally weighted.

v. The weighted sum of deprivations is generated for each individual/household, and it is called "deprivation score" for each unit.

vi. A poverty cut-off which is a deprivation score to be counted as multidimensionally poor is determined. Afterwards, each individual/household is identified as multidimensionally poor or not. We use the standard 1/3 poverty cut-off which means that only the households who are deprived in at least 33.3% of the weighted indicators are considered multidimensionally poor.[1]

vii. Deprivations of the non-poor are censored,[2] and the ratio of multidimensionally poor people is computed. This ratio is the headcount ratio (H) of multidimensional poverty.

viii. Deprivation scores of the people in multidimensional poverty are added up and divided by the total number of poor people to compute the average intensity of multidimensional poverty (A).

ix. Adjusted headcount ratio (M) is computed as the product of headcount ratio (H) and average intensity (A).

[1] For a robustness check, alternative poverty cut-offs (i.e., ½ and ¼) are also applied (see Table A.5 in the appendix). Although the results notably changed once we used the ½ cut-off, the regional concentration of multidimensional poverty, rankings of regions, and dimensional contributions remained almost unchanged.

[2] This characteristic of the AF methodology is consistent with poverty focus and allows for satisfying the property that a poverty measure should be independent of the acquisitions of the non-poor.

$$M=HxA$$

Adjusted headcount ratio (aka MPI) is the rate of weighted deprivations of the poor out of the total number of deprivations that could have been experienced if all people in the society were poor and deprived in all dimensions. The AF methodology is easy to compute and valid for ordinal data. The AF methodology is also decomposable which means that an MPI can be broken down by subgroups of the population (e.g., by regions, genders, age groups, ethnicity, etc.). Another attractive characteristic of the AF methodology is that it allows for dimensional breakdown, and therefore deprivations contributing to poverty at most can be revealed. It also satisfies dimensional monotonicity, so that if a poor individual/household ends up being deprived in a dimension, the poverty measure reduces, and vice versa. The standard headcount ratio (H) does not satisfy dimensional breakdown and dimensional monotonicity, but the adjusted headcount ratio (M) does.

Individuals or households are often used as the unit of identification in poverty measures. In this study, though the unit of identification is households due to data constraints,[3] the unit of analysis (i.e., how the results are reported) is individuals. Even if this approach cannot capture the intra-household inequalities,[4] it allows us to measure poverty among the whole population instead of only the population aged 15 or older as most of the previous studies did.

By applying the Alkire-Foster methodology and considering the global MPI, national MPIs of other developing countries, and previous MPIs in the literature, this study estimates a national MPI for Türkiye at the regional level. For this purpose, the SILC micro dataset for the 2014-2022 period is used. Estimations start from 2014 since the required regional data is available thenceforth. The dimensions and indicators of the MPI are given in Table 1. It has five dimensions (i.e., education, health, housing conditions, material deprivation, and social exclusion) and 22 indicators. All indicators are binary variables which take either zero (for non-deprived) or one (for deprived). This index brings a new dimension, social exclusion, and some new indicators (e.g., overcrowding and internet access) compared to the previous MPIs generated for Türkiye in the literature.

The education dimension is comprised of two indicators: average years of schooling and illiteracy. Households are considered deprived in E1 if the average years of schooling of the household members who are aged 15 or older are less than 8 years. Considering that the legally compulsory education period in Türkiye has been 8 years since 1997 and 12 years since 2012, households whose average education degree is below the compulsory education are deprived in this indicator. Another indicator for education deprivation is illiteracy: If a household member aged 15 or above is illiterate, the household is considered as deprived in E2.

The health dimension consists of three indicators: Limited daily activity (a household is deprived if a member aged 15 or above has limitation in daily activities at

[3] Data on education, health, and four indicators of social exclusion is available for people aged 15 or older.

[4] Some factors such as gender, age, job status, etc. may lead to disparities in bargaining power among household members, and thus intra-household inequalities (see for example, Haddad and Kanbur, 1990; Jenkins, 1991).

least for six months due to a physical or mental health problem); inability to access to health services (a household is deprived if at least a member aged 15 or above is unable to access health services in the last 12 months); lack of micronutrients (a household is deprived if it cannot afford to eat meat/chicken/fish -or equivalent for vegetarians- once every two days). Instead of food poverty, micronutrient deficiency is a widespread problem in our time (Banerjee and Duflo, 2012), and the lack of micronutrients implies to bad health status.

Table 1. Dimensions and indicators of the MPI

Dimension	Indicator
Education (1/5)	E1: If the average years of schooling among household members aged 15 or older is less than 8 years (1/10)
	E2: If a household member aged 15 or above is illiterate (1/10)
Health (1/5)	H1: If a household member has a physical or mental health problem limiting daily activity (1/15)
	H2: If a household member is unable to access health services (1/15)
	H3: Lack of micronutrients: inability to afford a meal with meat, chicken, or fish (or equivalent for vegetarians) once every two days (1/15)
Housing conditions (1/5)	HC1: Problems in walls, floor, and roof (1/30)
	HC2: Lack of indoor toilet or bathroom (1/30)
	HC3: Overcrowding: 2.5 or more persons share a bedroom (1/30)
	HC4: Environmental problems in the neighbourhood such as air or environmental pollution due to traffic or industry (1/30)
	HC5: Crime and violence in the neighbourhood (1/30)
	HC6: Heating problem due to lack of isolation (1/30)
Material deprivation (1/5)	M1: Lack of at least 3 out of 5 assets (mobile phone, TV, computer, dishwasher, and automobile) due to financial limitations (1/25)
	M2: Inability to pay housing rent, mortgage credit, or loan on interest two or more times in the last 12 months (1/25)
	M3: Inability to pay bills (electricity, water, or gas) two or more times in the last 12 months (1/25)
	M4: Inability to repay a credit card debt or other debts two or more times in the last 12 months (1/25)
	M5: Inability to meet an unexpected but compulsory expenditure (1/25)
Social exclusion (1/5)	S1: If there is an unemployed[5] household member (1/30)
	S2: If there is a household member who does not have social security in his/her main job (1/30)
	S3: Inability to eat -or drink- out or at home with family or friends at least twice a month due to financial difficulty (1/30)
	S4: Inability to participate in activities such as sports, cinema, or concerts at least twice a month due to financial difficulty (1/30)
	S5: No access to the internet due to financial limitations (1/30)
	S6: If household adult equivalised income is less than 60% of the median per adult equivalent income (1/30)

Note: Weights of the indicators and dimensions are given in the parentheses.

The housing conditions dimension includes six indicators: Problems in walls/floor/roof; lack of indoor bathroom and toilet; overcrowding; environmental problems; crime/violence in the neighbourhood; and problems with heating the house. The overcrowding indicator is used in this MPI similar to that in the national MPIs of other developing countries such as Chile and Mexico. The material deprivation dimension covers a lack of assets, inability to pay housing rent, mortgage, loans on interest, bills, credit card debts, other debts, and inability to afford an unexpected but

[5] If a household member is looking for a job it takes one, and zero otherwise.

compulsory expenditure. It is, to some extent, similar to the definition of Eurostat which describes material deprivation as the situation of people who have financial problems. The social exclusion dimension covers unemployment; lack of social security; inability to eat/drink with friends/relatives at least once a month due to financial limitation; inability to participate in leisure activities because of financial hardship; a lack of access to the internet due to financial limitation; and relative income poverty. Some developing countries such as Chile, Mexico, and Panama adopt similar indicators of social exclusion in their national MPIs. Social exclusion is a concept in which individuals experience problems with participating in the society where they live. Limited monetary resources inhibit individuals from feeling just like the other people in society. Being out of employment or social security usually results in exclusion from society. Paid work does not only provide monetary resources, but also it is an important arena of social interaction and contact. Therefore, unemployed people very likely suffer from social exclusion (Gordon et al., 2000). Lack of participation in social activities due to lack of monetary resources is another indicator of social exclusion. In this digital age, the absence of internet access because of financial limitations is also considered an indicator of social exclusion.

3. Results

This section presents the estimation results of the MPI. Regional MPI estimates are provided in the first sub-section, and it is followed by the decomposition of the regional MPIS. Finally, a descriptive analysis on the relationship between regional MPIs and regional macroeconomic and social variables is presented.

3.1. Regional MPI estimations

Table 2 shows the regional multidimensional poverty rates for the 2014-2022 period. The details of the NUTS regions of Türkiye can be found in Table A.1 in the appendix. The map of NUTS-2 regions is also provided in Figure A.1. In Table 2, the first row demonstrates the multidimensional poverty rate in the whole country. It seems that more than 43 per cent of the population was multidimensionally poor at the beginning of the period, and this ratio decreased to 29.1 in the end. Despite the considerable fall in the multidimensional poverty rate, three out of every ten people were still in multidimensional poverty in 2022. In other words, more than 24 million people was suffering from multidimensional poverty at the end of the period. The detailed results of the nation-level estimation are given in the appendix between Tables A.2 and A.5. More importantly, there is a substantial variation in the multidimensional poverty rates between regions. For instance, while the multidimensional poverty ratio in TR51 (Ankara) was 11.4 per cent in 2022, this ratio was more than 60 per cent in TRB2, TRC2, and TRC3.

Table 2. Regional multidimensional poverty rates

Region	2014	2015	2016	2017	2018	2019	2020	2021	2022
TR	43.2	43.5	38.6	35.6	33.9	34.9	31.6	31.5	29.1
TR10	29.7	35.4	29.3	27.2	26.9	29.5	25.2	25.4	22.5
TR21	22.9	28.3	21.9	23.5	22.6	27	21.7	22	18.3
TR22	25.7	45.1	33.3	26.9	23.7	24.2	21.1	21.1	18.3
TR31	38.1	42.8	33.5	32.8	26.7	26.2	27.3	26.2	24.6
TR32	32.4	35.1	29.3	29	28.2	28.9	24.8	18.8	17.3
TR33	28.6	28.3	22.9	22.3	19.8	23.8	22	24.2	21.4
TR41	28.2	28.5	23.3	23.2	22.6	23.1	18.6	17.8	21.6
TR42	43.5	33.8	27.1	15.5	16.6	19.2	14.5	19.1	14.5
TR51	25.1	20.1	14	16.6	16.9	14.9	10.2	9.5	11.4
TR52	39.5	29.4	29.9	25.2	22.4	23.8	18.8	26.4	18.2
TR61	36.6	37.9	38.9	28.9	29.9	33.9	29.8	30.9	28.8
TR62	49.7	49.3	45.3	33	28.2	31	32.4	36.6	34.4
TR63	59.4	58.2	50.1	49.4	49.5	54.9	50.5	52.1	48.8
TR71	30.2	35.2	33.3	33.1	30.6	27.9	24.8	23.2	21.8
TR72	47.2	46.3	53	46.2	38.4	31.9	30	24	19.5
TR81	36.3	41.1	35.5	32.6	34.2	28.6	22.8	20.1	22.6
TR82	38.8	36.6	29.6	29.1	25	32.8	29.5	27.8	22.1
TR83	51.1	49.1	42.1	38.4	35.7	36.9	36.3	36.2	32.2
TR90	43.2	43.7	46.2	44.4	40.5	41.8	39.9	32.4	31.3
TRA1	59.4	52.3	41	39.9	32.3	35	36.6	32.9	30.3
TRA2	79.3	74.1	72.3	71.1	70.9	69	64	66.1	59.7
TRB1	59.3	56.8	38.8	35.9	26.8	26.8	25.4	24.5	24.9
TRB2	82.6	82.4	79.7	75.8	76.1	72.1	71.4	69.8	64.2
TRC1	67.8	65.9	58.2	60.4	58.4	57.9	50.8	44.1	42.5
TRC2	84.9	81.7	81.8	79.9	81.2	76.7	73.8	75.4	68.3
TRC3	77.2	71.6	69.8	66.8	68.9	71.1	63.9	67.5	66.6

Source: Authors' own estimations

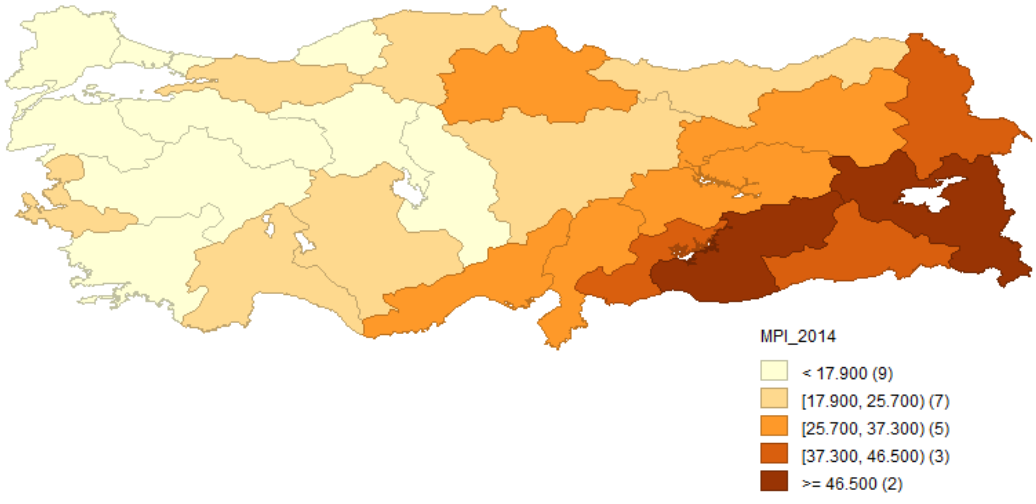
Table 3 presents the regional MPIs which are the product of headcount ratio (H) and average intensity (A) in each region. As mentioned earlier, it has some advantages over the traditional headcount ratio. For example, it allows for dimensional breakdown and satisfies the monotonicity axiom. It seems that there has been a substantial reduction in the MPIs from 2014 to 2022. There seem notable disparities between regions again. Indeed, while the MPIs in many regions have become less than 10 per cent in recent years, some regions such as TRB2, TRC2, and TRC3 have MPIs greater than 30 per cent.

Table 3. Regional MPIs

Region	2014	2015	2016	2017	2018	2019	2020	2021	2022
TR	21.8	21.6	18.6	16.9	16	16.4	14.6	14.6	13.2
TR10	13.8	16.9	13.8	12.6	12.8	13.8	11.5	11.6	9.9
TR21	10.6	12.8	10.5	11.2	10.7	13	9.8	10.2	8.4
TR22	11.4	21.5	14.5	11.7	10.1	10.7	9.3	8.8	7.6
TR31	18.9	21.6	15.7	15.5	12.4	12	12.1	11.9	10.8
TR32	14.3	15.7	12.6	12.4	12.2	12.6	10.9	7.8	7.4
TR33	12.6	12.6	9.9	9.5	8.5	9.9	9.3	10.2	9.1
TR41	13.2	13.3	10	9.9	9.5	9.8	7.8	7.7	9.5
TR42	21.1	14.9	12.1	6.4	7	8.1	5.9	8.1	5.8
TR51	11.2	8.7	6.2	7.5	7.4	6.5	4.2	4	4.8
TR52	18.4	13.1	12.9	11	9.8	10.3	8.1	11.7	7.7
TR61	18.4	18.4	18.9	13.3	13.6	16.2	13.9	14.3	12.7
TR62	25.7	24.4	22.5	15.1	12.5	14.2	14.7	16.8	15.9
TR63	31.4	30.5	25.3	24.3	24.8	27.2	24.2	24.8	23.2
TR71	13.6	15.8	14.8	14.5	13.6	12.4	10.9	10.2	9.7
TR72	22.9	22.2	26.2	21.6	18.5	14.8	12.8	10.2	8.2
TR81	15.9	19	16.4	14.2	14.9	11.8	9.4	8.4	10
TR82	17.9	16.5	12.8	12	10.5	13.4	12.5	12	9.1
TR83	25.9	23.7	18.6	16.4	15.2	16.4	15.9	16.3	13.9
TR90	20.5	20.5	21.1	20.7	18.7	19.6	18.2	14.3	13.9
TRA1	32.1	26.2	19.2	18.9	14.1	16.1	17.2	14.9	13.4
TRA2	43.4	42.1	38.7	36.3	35.7	34.7	31	34.2	29.2
TRB1	30.3	27.6	17.9	15.6	10.7	10.8	10.4	9.8	10
TRB2	46.5	45.6	42.2	38.5	37.5	35.6	35.9	35.8	31.9
TRC1	37.3	35.9	29.5	30.1	29.5	28.1	24.1	20.8	19.3
TRC2	50.5	47.5	44.6	43.5	42	40.5	38	39.3	34.1
TRC3	40.3	36.8	34.6	34.3	34.9	36.3	31.5	33.4	32.1

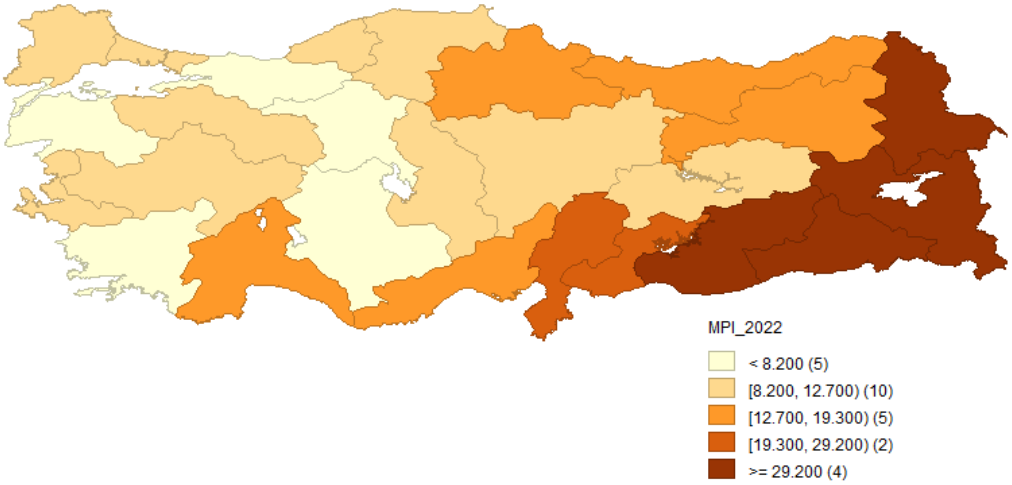
Source: Authors' own estimations

Figure 1. Regional multidimensional poverty indices in 2014 (%)



Source: Authors' own estimations

Figure 2. Regional multidimensional poverty indices in 2022 (%)



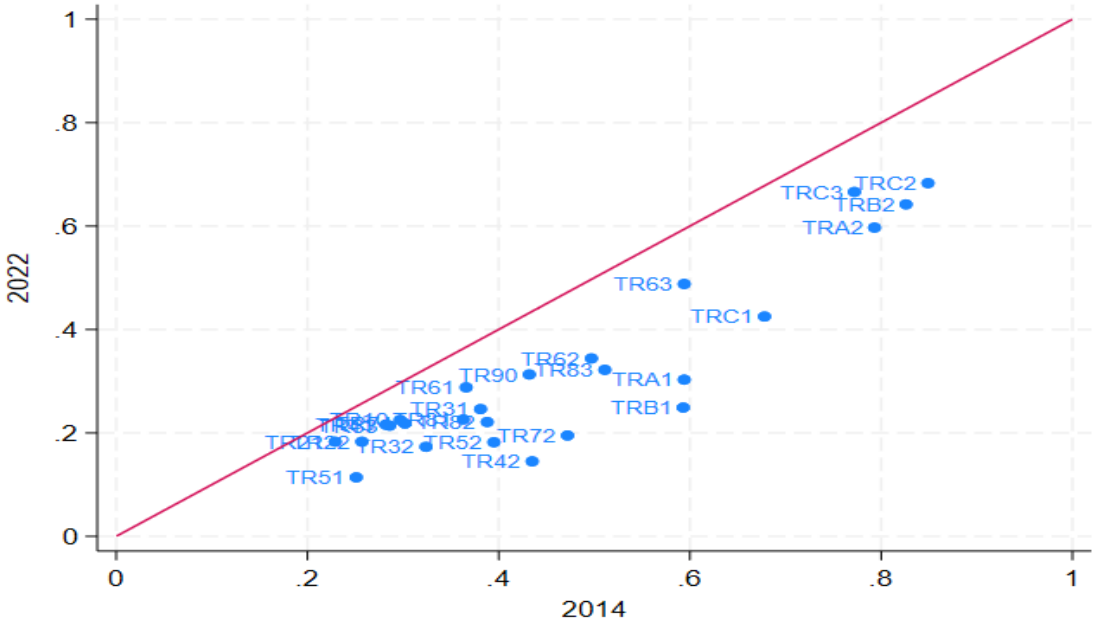
Source: Authors' own estimations

Figure 1 and Figure 2 provide regional maps of MPIs for the year 2014 and 2022, respectively.[6] Once these maps are examined, regional duality in multidimensional poverty seems more obvious. The Southeastern and Eastern Anatolia regions have much more prevalent multidimensional poverty compared to the Western regions of the country. At the end of the period, even though all the regional MPIs fell, the concentration of poverty in the South-eastern and Eastern parts remained unchanged. This finding implies to the persistence of the regional disparities in the country.

Figure 3 compares the regional multidimensional poverty rates in 2014 vs. 2022 with a 45° line. It shows that multidimensional poverty rates decreased in all regions without exception from 2014 to 2021 (all regions are located below the 45° line). Especially, there have been massive poverty reductions in TRB1 (34.4 percentage points), TRA1 (29.1 points), TR42 (29 points), TR72 (27.7 points), and TRC1 (25.3 points). These regions need to be examined thoroughly to figure out how poverty can be alleviated also in other regions. Still, regions with the highest rates of poverty at the beginning are also the poorest regions at the end of the period, implying to the regional persistence of poverty. In particular, a targeted poverty alleviation strategy is required to alleviate the prevalent multidimensional poverty in TRA2, TRB2, TRC2, and TRC3 regions.

[6] These figures are natural break maps.

Figure 3. Regional multidimensional poverty rates in 2014 vs. 2022

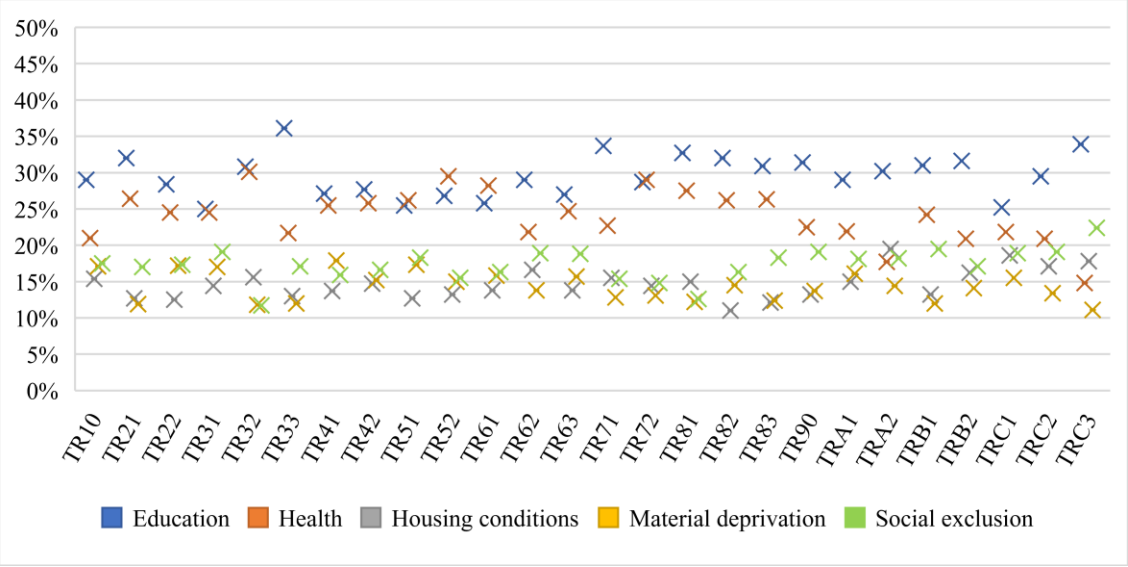


Source: Authors' own estimations

3.2 Decomposition of regional MPIs

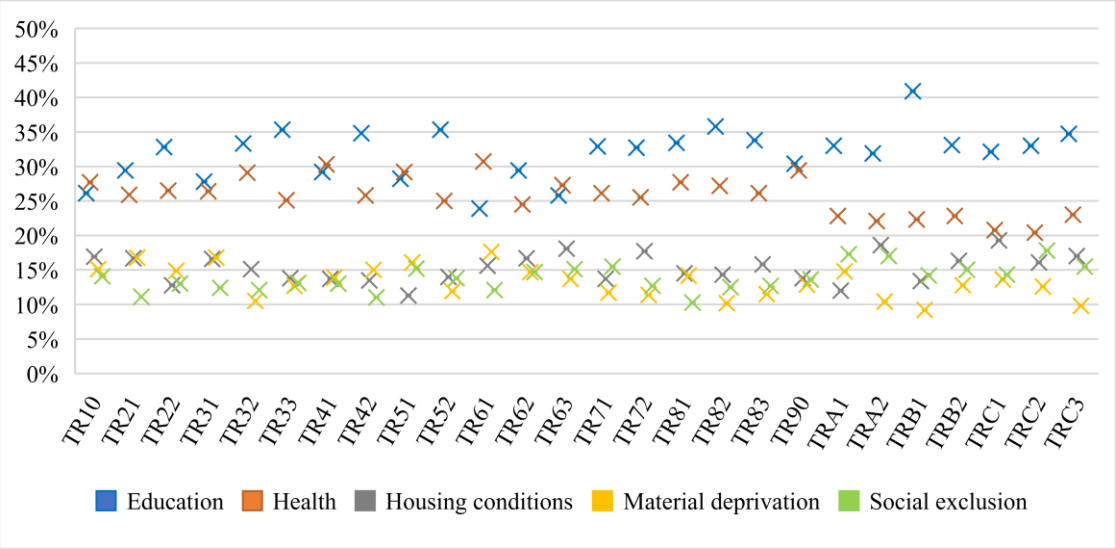
Figure 4 and Figure 5 indicate the contribution of each dimension to the regional MPIs in 2014 and 2022, successively. Education emerges as the most problematic dimension in almost all regions, and it is followed by the health dimension. After education and health, the other three dimensions of the MPI have approximately the same contribution rates. This situation does not notably change over time.

Figure 4. Regional contribution of each dimension in 2014



Source: Authors' own estimations

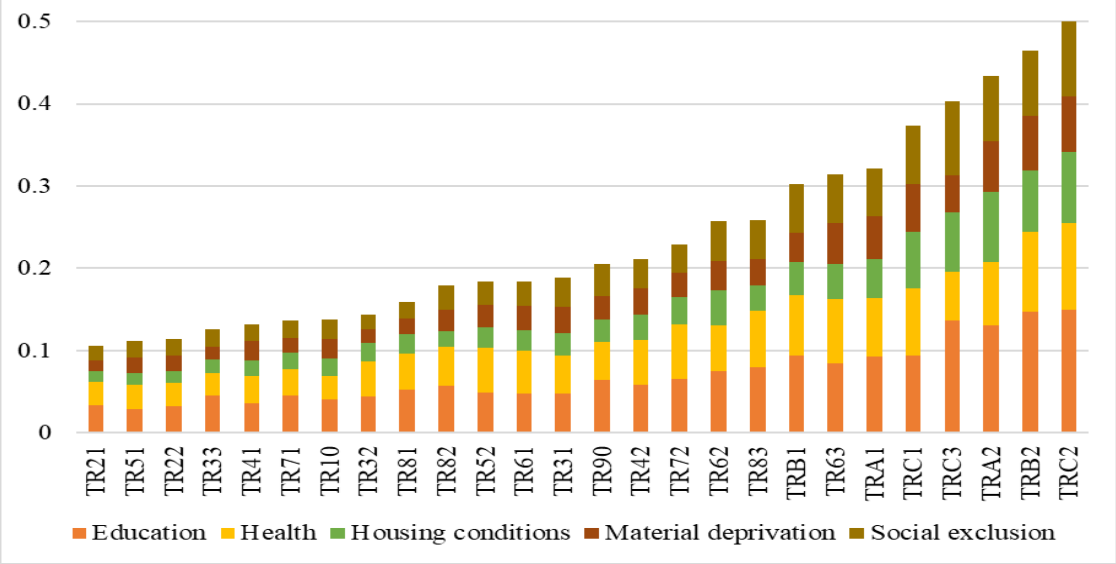
Figure 5. Regional contribution of each dimension in 2022



Source: Authors' own estimations

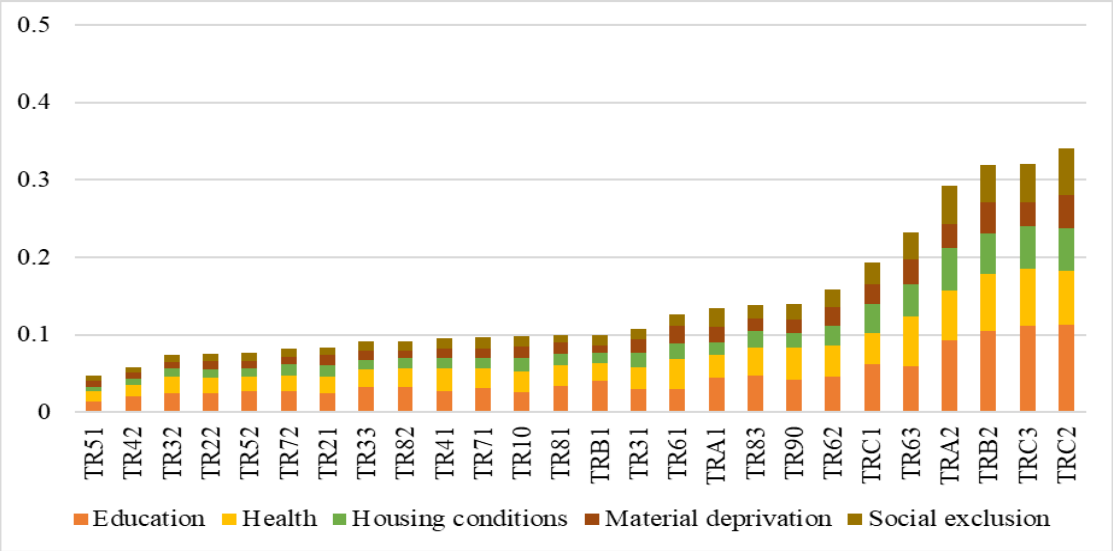
Regional MPIs by dimensional decompositions are presented in Figure 6 and Figure 7 for the beginning and end of the period. Although the MPIs significantly decreased from 2014 to 2022, the relative importance of the dimensions remained almost the same. It is obviously seen that education and health are the dimensions in which people in all regions have the highest deprivations. Therefore, policies towards reducing the deprivations in these two dimensions need to be prioritized. Deprivations in the housing conditions, material deprivation, and social exclusion seem less striking in general. However, as well as education and health, these three dimensions are also still problematic in the Southeastern and Eastern regions.

Figure 6. Regional MPI by dimensional contributions in 2014



Source: Authors' own estimations

Figure 7. Regional MPI by dimensional contributions in 2022



Source: Authors' own estimations

3.3 Regional MPIs and regional macroeconomic and social indicators

A descriptive analysis of the relationship between regional MPIs and some regional factors is presented in this sub-section. This analysis would improve our understanding of the regional multidimensional poverty in Türkiye. We restrict the analysis with the macroeconomic and social indicators that might be theoretically related to poverty and are available at the NUTS-2 level for the 2014-2022 period. The definitions of these variables are given in Table 4. Macroeconomic indicators used in this analysis are GDP per capita from three main sectors (i.e., industry, services, and agriculture),[7] unemployment rate,[8] exports and imports rates as indicators of openness to trade,[9] credits per adult as an indicator of accession to credit,[10] per capita social assistance which represents the government policy towards poverty alleviation. Considering the inflationary structure of the Turkish economy, it is vital to use the macroeconomic variables in real terms. Therefore, GDPs, credit levels, and social assistance expenditures are adjusted to 2014 price levels. As for social indicators, we employ the Gini coefficient as an indicator of income inequality, female labour force participation which is an important study area due to the persistent low rates in the

[7] Economic growth is largely regarded as a key to eradicating poverty (see for example, Ravallion and Datt, 1992; Ravallion, 2001; Dollar and Kraay, 2002).

[8] Unemployment is very often regarded as the main reason for poverty (see for example, (Freeman, 1991; Tobin, 1994; Minsky, 2013).

[9] The effect of trade openness on poverty is often unambiguous (see for example Vos, 2008; Cockburn and Giordano, 2008).

[10] Many studies suggest that financial inclusion can reduce poverty risks (see for example Omar and Inaba, 2020; Alvarez-Gamboa, et al., 2021).

country,[11] early motherhood rate,[12] number of students per teacher as a proxy for the quality of education,[13] and net migration rate.[14] Summary statistics of these variables are given in Table A.6 in the appendix.

Table 4. Definition of the variables

Variable	Definition	Source
$GDP_{industry}$	Natural logarithm of real GDP per capita (industry)	TurkStat
$GDP_{services}$	Natural logarithm of real GDP per capita (services)	TurkStat
$GDP_{agriculture}$	Natural logarithm of real GDP per capita (agriculture)	TurkStat
unemployment	Unemployment rate	TurkStat
Exports rate	Total value of exports divided by GDP ($)	TurkStat
Imports rate	Total value of imports divided by GDP ($)	TurkStat
Credits per adult	Natural logarithm of the real value of total credits per adult[15]	The Banks Association of Türkiye
Social assistance[16]	Natural logarithm of the real value of per capita social security and social assistance expenditures (TL)	Ministry of Treasury and Finance
Gini	Gini coefficient	TurkStat
Female labour force participation	Female labour force participation rate	TurkStat
early motherhood	The ratio of births by mothers under 18-year-old to total births	TurkStat
Net migration rate	The net number of emigrants per thousand people who can migrate[17]	TurkStat
Student per teacher	Number of students per teacher (primary school)	TurkStat

The following figures show the relationships between regional MPIs estimated in this study and regional variables. They also include the pairwise correlation coefficients. Except for agricultural GDP, all of the correlation coefficients are statistically significant at the 95% confidence interval. Figure 8 demonstrates that there is a strong and negative connection between regional MPIs and per capita industrial GDP with a very high correlation coefficient (i.e. –0.72). It is obvious that regions with high levels of per capita industrial GDP have lower MPIs, and vice versa. A similar linkage is observed between MPIs and per capita GDP levels in the services sector (see Figure 9), but it is not as strong as the one between industrial GDPs and MPIs. On the other hand, the link between per capita agricultural GDP levels and MPIs is unclear, and TR10 (Istanbul) and TR51 emerge as outliers (see Figure 10). These outliers have low MPIs

[11] Indeed, only 40 per cent of the 15–64-year-old women were in the labour force in 2022, and this was by far the lowest rate in the OECD group just like the previous years.

[12] Early motherhood rate can be considered as a variable not only about being a mother at a young age but also a deeper indicator of gender discrimination and social institutions in the region. It carries information about the role of girls in society and can also be interpreted as a proxy for the "child bride" issue.

[13] There is a potential connection between poverty and low quality of education (see for example, Kokkenlenberg, Dillon, and Christy, 2008; Van der Berg et al., 2011).

[14] Migration is a factor that might be related to poverty too.

[15] The adult is defined here as individuals aged 20 or above.

[16] Social assistance includes sickness and disability benefits, old-age benefits, widow and orphan pensions, family and child benefits, unemployment benefits, and housing benefits.

[17] Net migration in a region is positive if it receives more people than it sends out.

despite their low levels of agricultural GDP. Besides, the regions with the highest MPIs (i.e., TRA2, TRB2, TRC2, and TRC3) have relatively high levels of per capita agricultural GDP. This finding may imply that these regions are at the earlier stages of their structural transformation and regional differences in the structural transformation levels can partly explain the regional variation in the multidimensional poverty.

Figure 8. MPI and GDP per capita (industry)

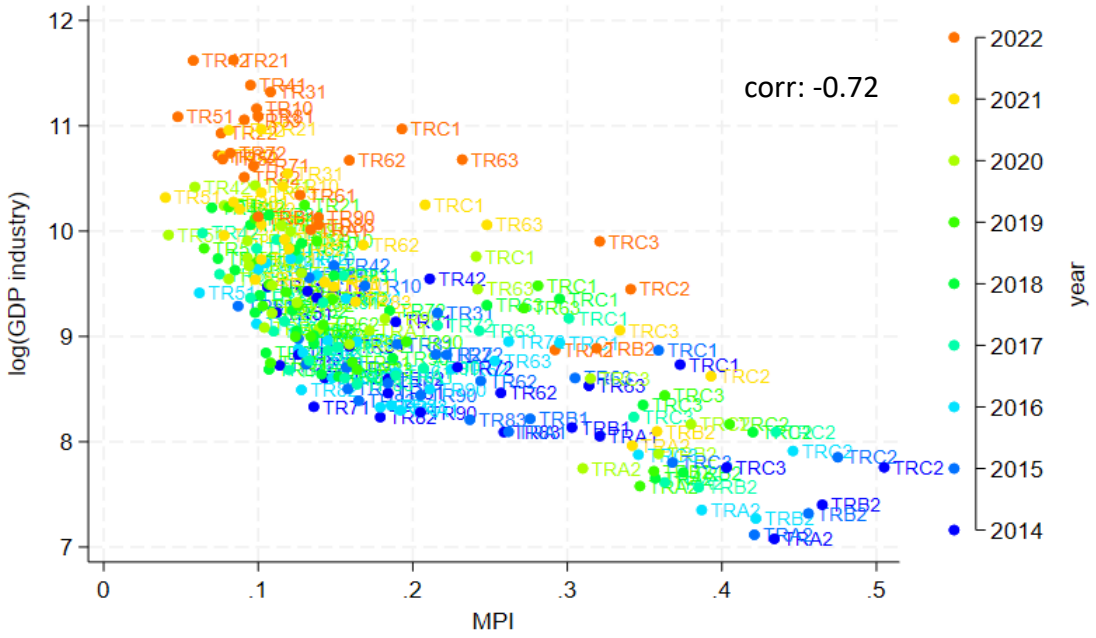


Figure 9. MPI and GDP per capita (services)

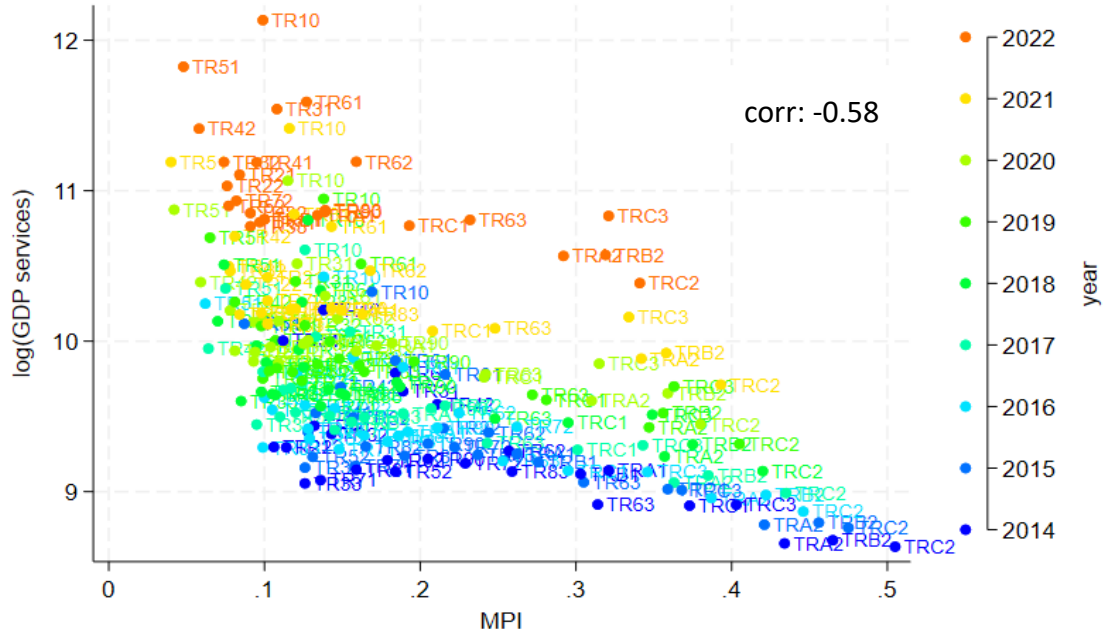


Figure 10. MPI and GDP per capita (agriculture)

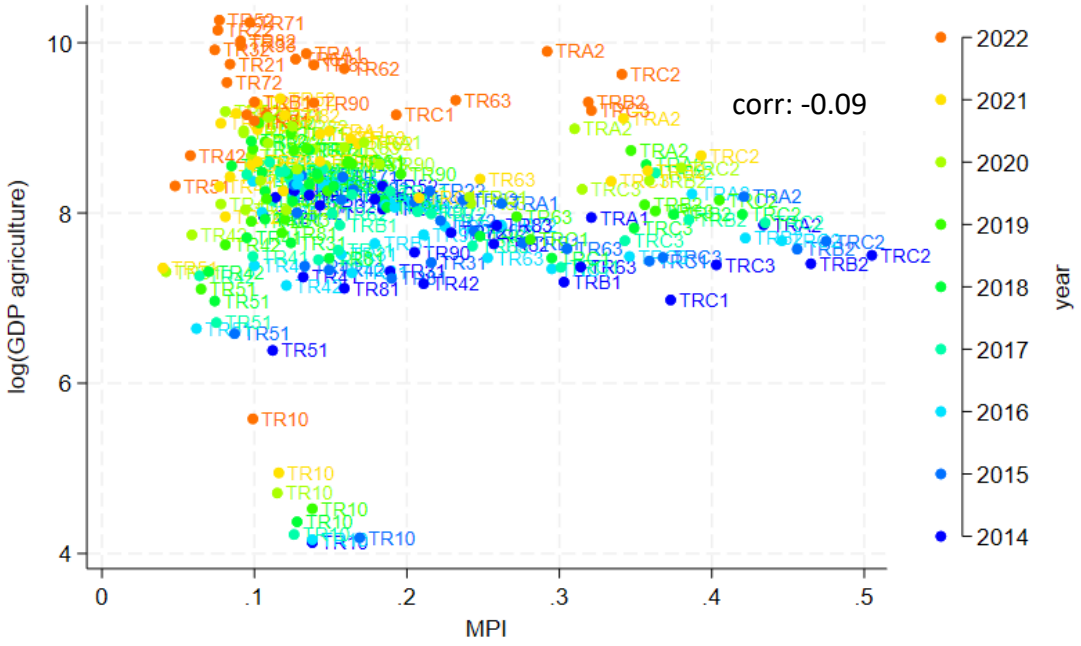


Figure 11. MPI and unemployment rate

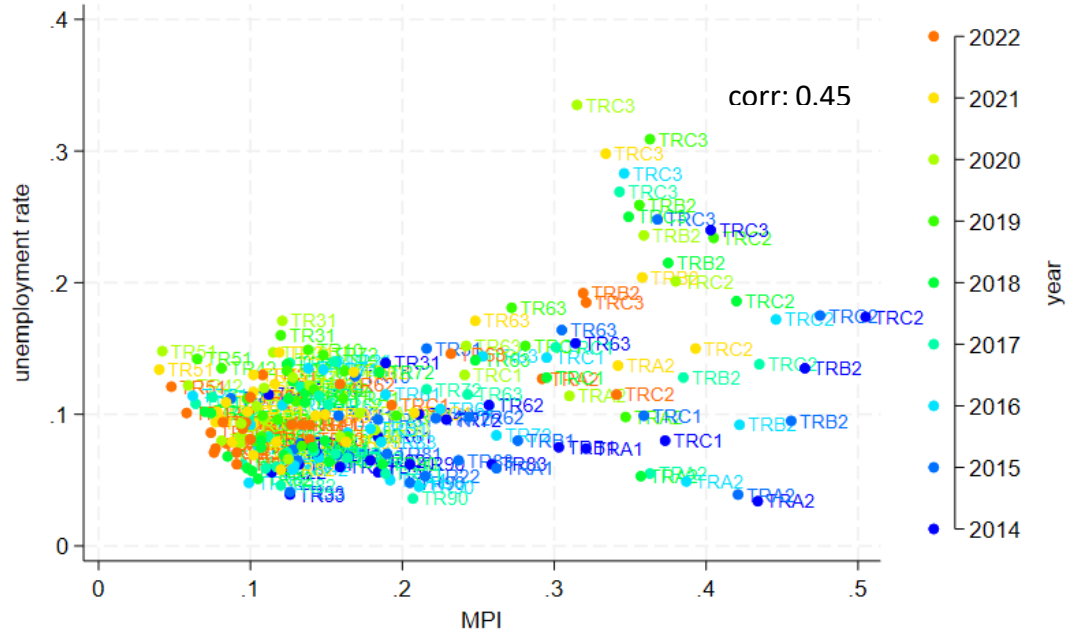


Figure 11 shows that there is a positive relationship between unemployment rates and MPIs. The regions with high rates of unemployment also have high levels of MPI, and vice versa. On the other hand, TRA2 and TRB2 have relatively low unemployment rates despite their high MPIs. This observation can be explained by the fact that agricultural employment is prevalent in these regions, and it is largely associated with low wages.

Figure 12. MPI and exports rate

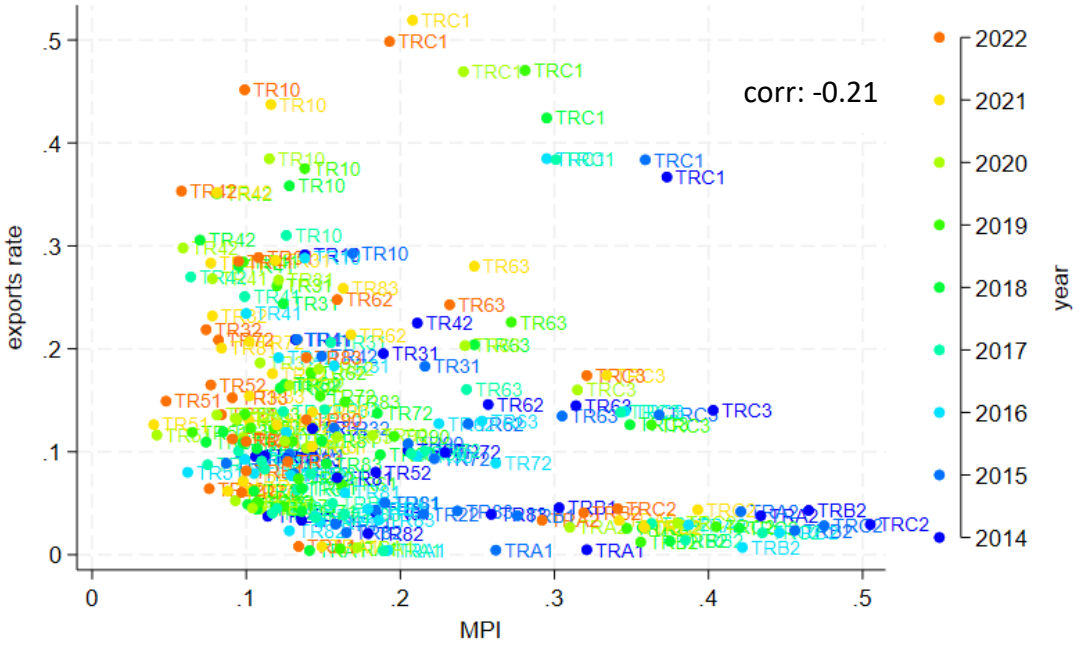
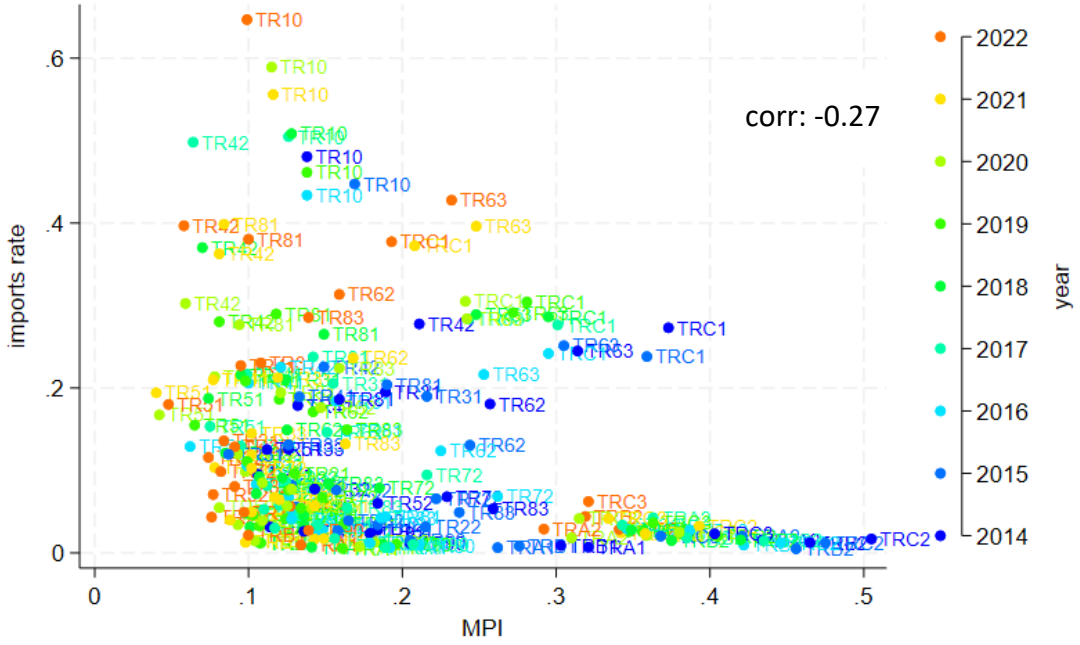


Figure 13. MPI and imports rate



Both export and import rates seem to be negatively connected with regional MPIs (see Figure 12 and Figure 13). Regions with higher export rates have lower MPIs, but TRC1 seems like an outlier.[18] Similarly, regions with higher import rates have lower MPIs, and vice versa. It seems that trade openness is associated with lower poverty, but

[18] It seems that high rates of exports in TRC1 do not help eliminate multidimensional poverty. They may even exacerbate inequalities within the region if profits from exports are obtained only from some privileged part of the society.

the direction of causality is unknown. Exports may help reduce multidimensional poverty, on the one hand. It is also possible that regions with low MPIs are more able to import and export, compared to those with high MPIs.

Furthermore, MPI decreases as access to credits improves (see Figure 14). Regions with high per adult credit levels have lower MPIs, and vice versa. There is a high negative correlation between these variables with a coefficient of –0.59.

Figure 14. MPI and credits per adult

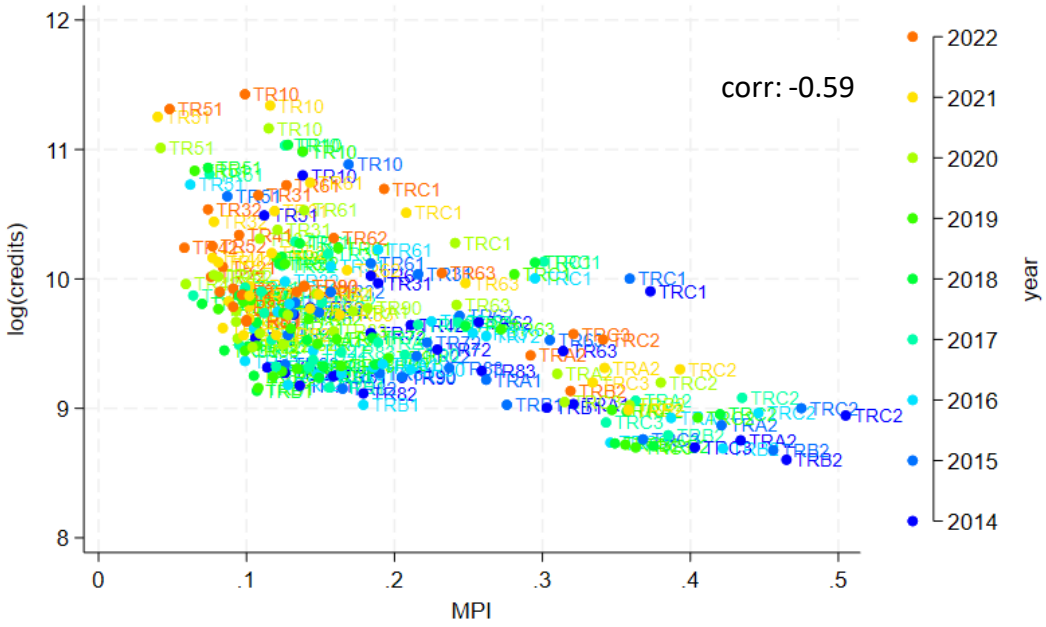


Figure 15 indicates that the relationship between per capita social assistance and MPIs is somewhat ambiguous. It seems that there is an inverted-U shape relation since the level of social assistance rises with MPI up to some degree (around 0.35), but then the social assistance level decreases as MPI ascends more. Still, once the time dimension of the social assistance variable is examined, it is observed that there is an improvement in the allocation of these benefits over time.

According to Figure 16, there is a positive sign link between regional Gini coefficients and MPIs. However, its correlation coefficient is somewhat low (i.e., 0.25), implying that income inequalities and multidimensional poverty may not always match well together.

Figure 15. MPI and per capita social assistance

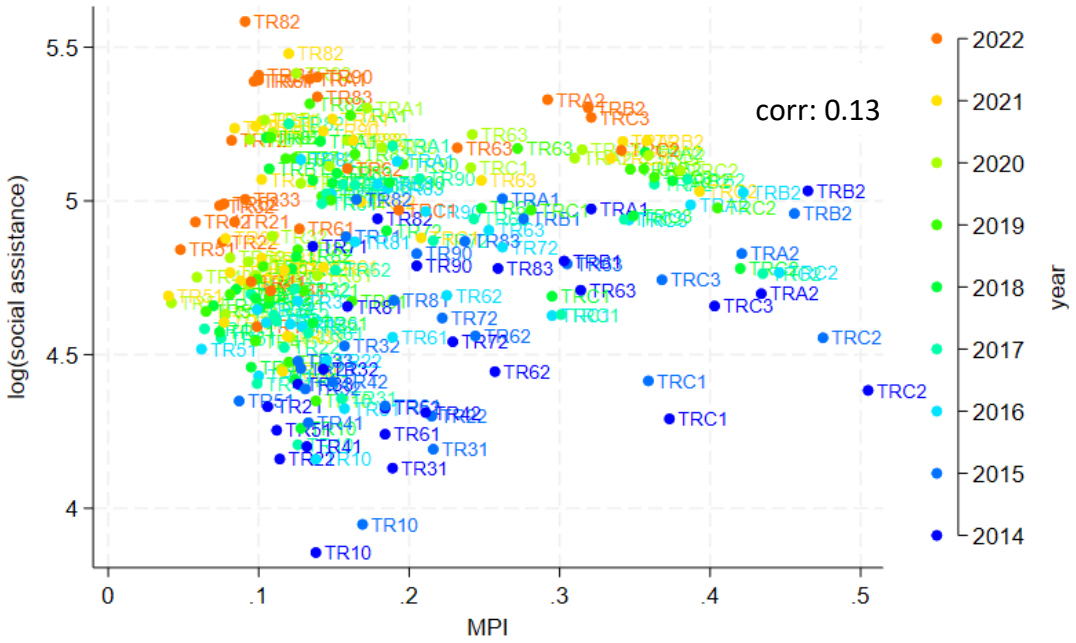


Figure 16. MPI and Gini

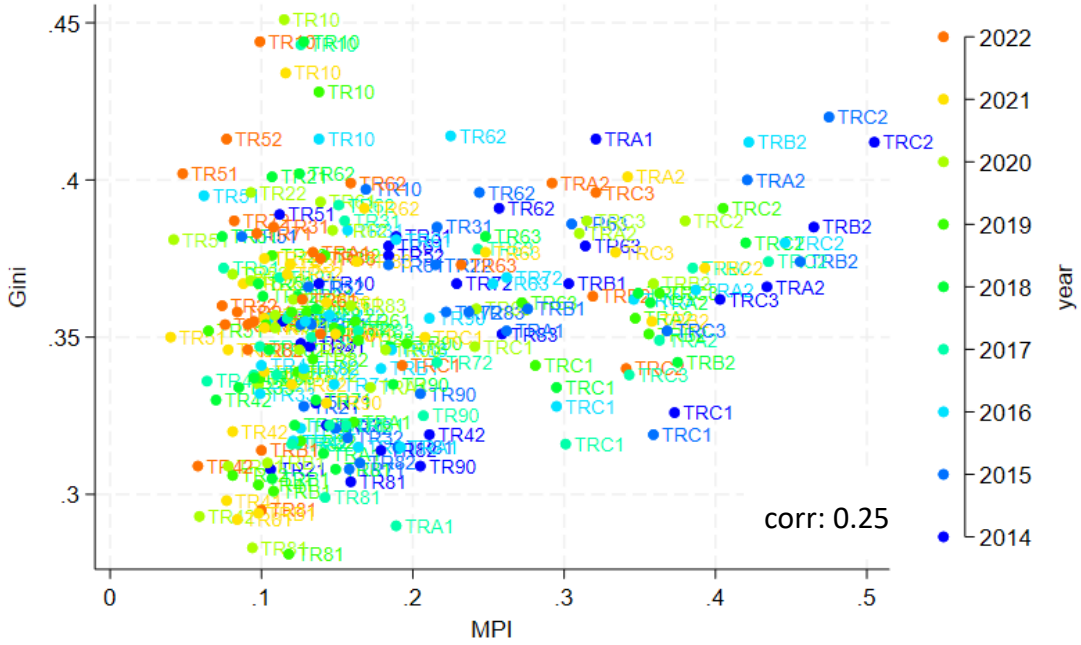


Figure 17 and Figure 18 present that while there seems a negative relationship between regional female labour force participation rates and MPIs (with a correlation coefficient of –0.61), a positive link is observed between regional early motherhood rates and MPIs (with a correlation coefficient of 0.74).

Figure 17. MPI and female labour force participation

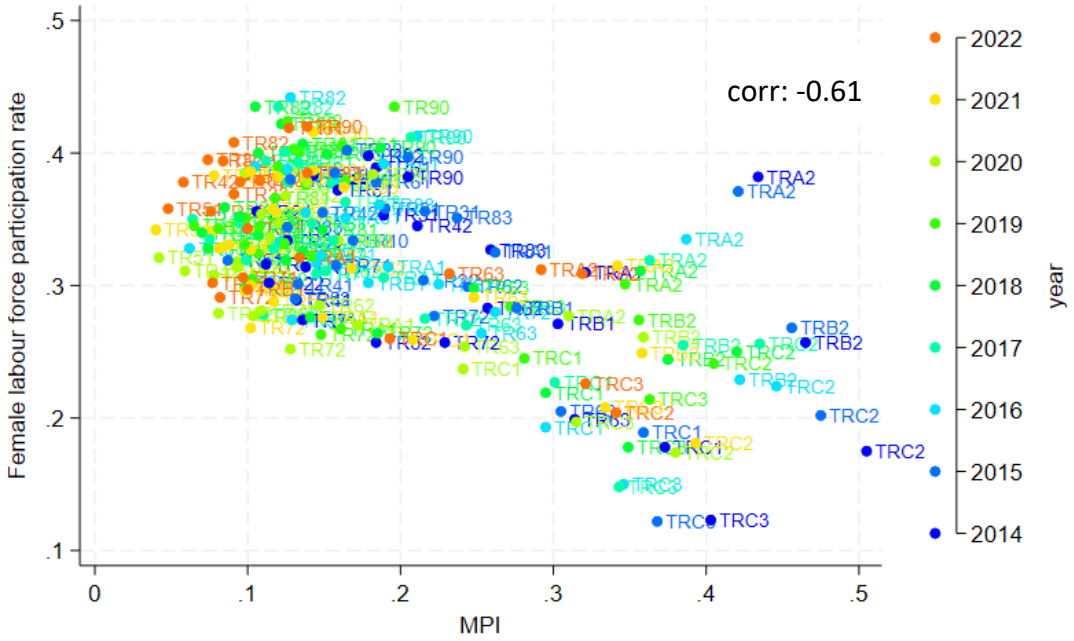


Figure 18. MPI and early motherhood rate

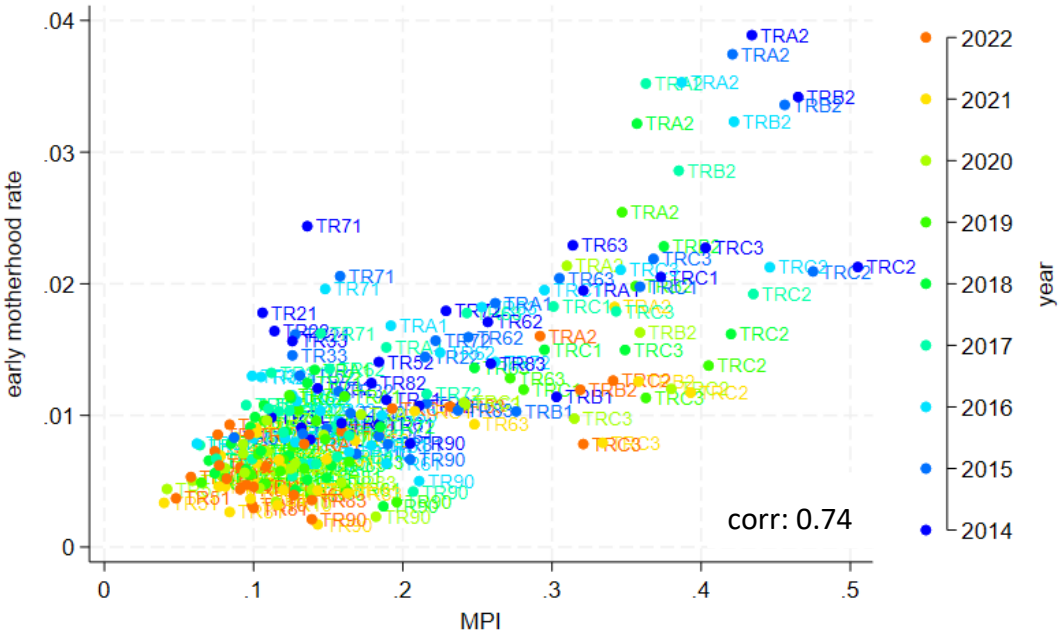
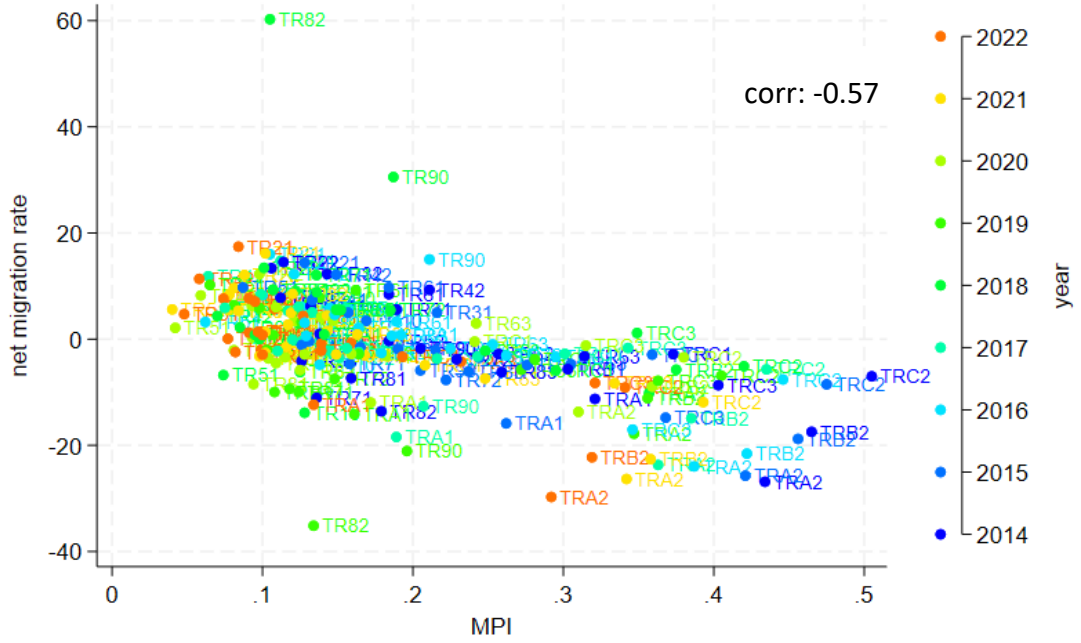


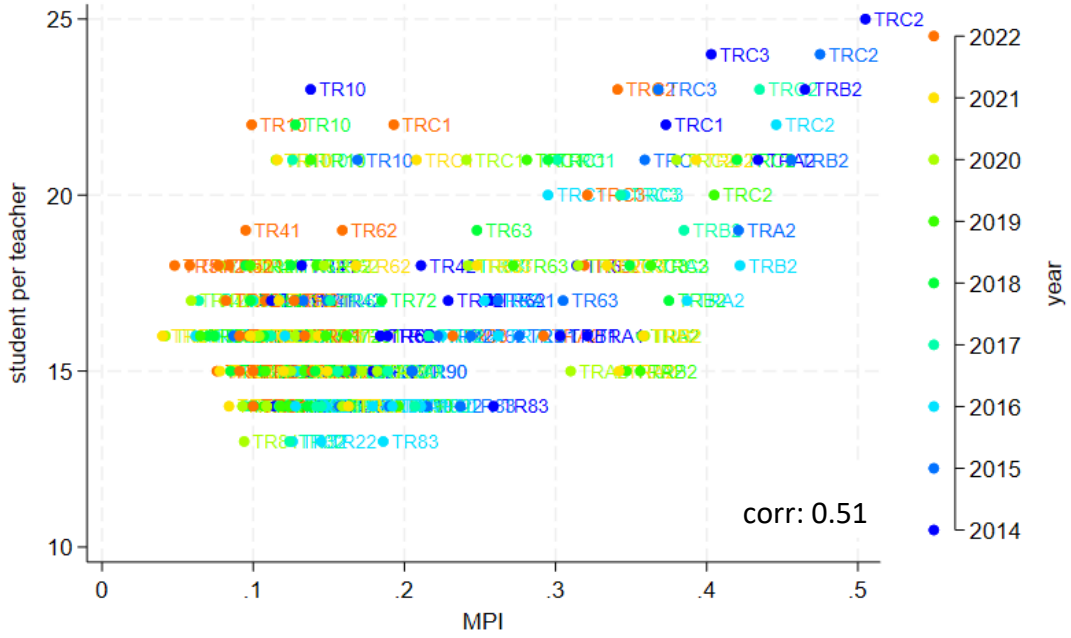
Figure 19 presents that a negative relationship exists between net migration and MPI with a correlation coefficient of –0.57. Net migration is negative in the regions with the highest MPIs, whereas it is mostly positive or close to zero in the regions with the lowest MPIs.

Figure 19. MPI and net migration rate



Finally, according to Figure 20, there is a positive connection between regional MPIs and the number of students per teacher with a correlation coefficient of 0.51. In particular, the number of students per teacher is much higher in the Southeastern and Eastern regions which suffer from multidimensional poverty at most.

Figure 20. MPI and number of students per teacher



4. Conclusion and discussion

Poverty statistics are fundamental economic and social indicators since they allow us to identify the groups, regions, and countries that need urgent intervention at most. They raise public awareness and are very useful in allocating social budgets and coordinating social policies. However, poverty measurement is a rather challenging task. In particular, monetary indicators of welfare used in the measurement of poverty have some limitations. In the last decades, the multidimensional poverty concept which complements monetary indicators with non-monetary indicators such as education, health, and housing conditions has emerged. Several developing countries have their country-specific MPI and utilize it as their official poverty statistic. Although there are a few MPIs in the literature, Türkiye does not have an official MPI yet. This paper extends the prior literature by measuring regional MPI in Türkiye and puts forward a detailed understanding of its nature on the basis of regional disparities employing a comprehensive descriptive analysis. Surveys of Income and Living Conditions (SILC) between 2014 and 2022 are used for this purpose.

Findings reveal that while 43 per cent of the population was in multidimensional poverty at the beginning of the period, this ratio decreased to 29 per cent in the end. More crucially, a considerable variation is found between regions. For example, in 2022, the multidimensional poverty ratio was 11.4 per cent in TR51 (Ankara), whereas it was more than 60 per cent in TRB2, TRC2, and TRC3. Likewise, the MPIs in many regions were lower than 10 per cent in recent years, while some regions such as TRB2, TRC2, and TRC3 had MPIs more than 30 per cent. A spatial clustering of poverty is observed as some previous studies found. Indeed, multidimensional poverty is largely concentrated in Southeastern and Eastern Anatolia. From 2014 to 2022, though multidimensional poverty reduced in all regions without exception, the regions with the highest poverty (i.e., TRA2, TRB2, TRC2, and TRC3) did not change in this period. This finding means that regional concentration of poverty is persistent, and a targeted anti-poverty strategy is required for these regions. On the other hand, in some regions, such as TRB1, TRA1, TR42, TR72, and TRC1, multidimensional poverty substantially decreased. The progress in these regions needs to be investigated thoroughly to reveal how multidimensional poverty can also be alleviated in other regions.

Once the dimensional decomposition of the MPIs is examined, it is concluded that education is the most problematic dimension in almost all regions and is followed by the health dimension. The relative importance of the dimensions did not notably change during the period. Hence, policies towards improving education and health conditions need to be prioritized. Still, social exclusion, housing conditions, and material deprivations are also still problematic in some of the Southeastern and Eastern regions, and therefore, region-specific anti-poverty policies would be useful in this case.

Afterwards, various scatter plots for regional MPIs and regional macroeconomic and social indicators are drawn to explicate the connection between regional poverty and regional conditions. The figures reflecting the association between sectoral per capita GDPs and MPIs show that there is a very strong and negative connection between industrial per capita GDP and MPIs. The regions with high per capita industrial GDP have low MPIs, and vice versa. GDP per capita in the services sector has also a negative link with regional MPIs, although it is not as strong as industrial GDP. On the other hand, the correlation between per capita agricultural GDP and MPIs is not statistically

significant, and TR10 and TR51 emerge as outliers. The regions with the highest MPIs have relatively high per capita agricultural GDP, implying that these regions are probably at the earlier stages of their structural transformation and the regional disparities in the levels of structural change can partly explain the regional differences in the MPIs.

A powerful and positive relationship between unemployment rates and MPIs is observed, supporting the previous literature arguing that employment is the key to poverty elimination (e.g., Karnani, 2009; Minsky, 2013). Furthermore, both export and import rates are found negatively connected with regional MPIs, implying that trade openness can lower poverty. Still, the direction of causality is unknown. On the one hand, exports may help reduce multidimensional poverty. On the other hand, regions with low MPIs may be more able to import and export, compared to those with high MPIs. Moreover, a high negative correlation is observed between regional MPIs and credits per adult. This result supports the previous studies (e.g., Bae, Han, and Sohn, 2012; Omar and Inaba, 2020; Alvarez-Gamboa, et al., 2021) emphasizing the importance of financial inclusion on poverty eradication.

The relationship between per capita social assistance and MPIs is found ambiguous. To some extent, an inverted-U shape relation is observed since the level of social assistance escalates with MPI until some degree (around 0.35), and then the social assistance level falls as MPI rises more. Besides, a positive link is found between regional Gini coefficients and MPIs, as expected. Still, its correlation coefficient is somewhat low, implying that income inequalities and multidimensional poverty may not always match well together.

Furthermore, it is discovered that regional MPIs are negatively related to regional female labour force participation rates, and positively linked with regional early motherhood rates with pretty high correlation coefficients. These findings are in line with our theoretical expectations and low rates of female labour force participation and prevalent early motherhood are, in fact, interconnected. These variables refer to gender discrimination and social institutions in the region. Remarkably, the regions with the highest MPIs have the lowest labour force participation rates among women and the highest incidence of motherhood before 18 years old. Therefore, a comprehensive poverty alleviation strategy should aim to change the prevalent negative cultural codes about the role of women in society especially in these regions.

Additionally, it is revealed that net migration is negative in the regions with the highest MPIs, while it is usually positive in the regions with the lowest MPIs. This finding implies that people migrate from regions with high MPIs to regions with lower MPIs. Finally, a positive association is observed between regional MPIs and the number of students per teacher. In particular, the number of students per teacher is much higher in the Southeastern and Eastern regions which suffer from the sharpest multidimensional poverty. Considering the fact that a high number of students lowers the quality of education, students in these regions may face high poverty risks in the future since low quality of education can adversely influence their future employability (see for example, Santos 2011). As Black and Devereux (2011) state, this situation may lead to intergenerational persistence of poverty, and policies improving the quality of education need to be produced especially in these vulnerable regions.

This descriptive analysis extends our information set about regional multidimensional poverty in Türkiye. Still, an empirical analysis is required to get more precise conclusions about the reasons for multidimensional poverty.[19] Besides, even if the NUTS-2 level dataset used in the current study allows us to examine regional poverty disparities up to some extent, a more detailed regional dataset such as at the NUTS-3 level would better unearth regional characteristics of poverty. With the data availability, future studies can generate better predictions and more specific regional poverty reduction policies.

[19] See for example, Acet Dönmez (2023) for an empirical analysis in this regard.

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Appendix

Table A.1 NUTS regions of Türkiye

NUTS-1 level regions	NUTS-2 level regions
TR1: İstanbul	TR10: İstanbul
TR2: Western Marmara	TR21: Tekirdağ, Edirne, Kırklareli
	TR22: Balıkesir, Çanakkale
TR3: Aegean	TR31: İzmir
	TR32: Aydın, Denizli, Muğla
	TR33: Manisa, Afyon, Kütahya, Uşak
TR4: Eastern Marmara	TR41: Bursa, Eskişehir, Bilecik
	TR42: Kocaeli, Sakarya, Düzce, Bolu, Yalova
TR5: Western Anatolia	TR51: Ankara
	TR52: Konya, Karaman
TR6: Mediterranean	TR61: Antalya, Isparta, Burdur
	TR62: Adana, Mersin
	TR63: Hatay, Kahramanmaraş, Osmaniye
TR7: Central Anatolia	TR71: Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir
	TR72: Kayseri, Sivas, Yozgat
TR8: Western Black Sea	TR81: Zonguldak, Karabük, Bartın
	TR82: Kastamonu, Çankırı, Sinop
	TR83: Samsun, Tokat, Çorum, Amasya
TR9: Eastern Black Sea	TR90: Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane
TRA: North-eastern Anatolia	TRA1: Erzurum, Erzincan, Bayburt
	TRA2: Ağrı, Kars, Iğdır, Ardahan
TRB: Central Eastern Anatolia	TRB1: Malatya, Elazığ, Bingöl, Tunceli
	TRB2: Van, Muş, Bitlis, Hakkari
TRC: South-eastern Anatolia	TRC1: Gaziantep, Adıyaman, Kilis
	TRC2: Şanlıurfa, Diyarbakır
	TRC3: Mardin, Batman, Şırnak, Siirt

Table A.2 Summary of MPI indicators

Indicator	Weight	Percentage of individuals deprived %								
Education		**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
E1	0.1	61.69	58.93	57.97	56.56	54.71	53.11	50.33	47.75	45.67
E2	0.1	28.29	27.41	26.35	24.95	23.79	22.84	21.46	20.00	19.14
Health										
H1	0.07	45.46	50.12	39.35	45.38	47.77	47.47	42.35	43.07	43.89
H2	0.07	27.56	23.77	15.77	14.10	15.01	14.97	8.48	19.30	12.22
H3	0.07	33.64	35.81	37.74	33.97	31.95	33.56	37.29	38.32	41.51
Housing conditions										
HC1	0.03	37.18	39.01	38.09	36.62	35.91	36.88	34.72	33.89	33.57
HC2	0.03	7.97	6.82	5.49	4.80	4.28	3.99	3.79	3.41	2.69
HC3	0.03	28.81	27.40	25.99	24.84	23.15	22.36	21.67	14.42	19.62
HC4	0.03	24.38	24.19	24.51	22.94	24.83	26.10	22.60	23.40	21.72
HC5	0.03	10.57	11.26	10.66	11.33	11.18	10.87	9.79	9.98	10.41
HC6	0.03	38.66	43.04	42.20	40.77	39.39	39.31	36.73	34.28	33.61
Material deprivation										
M1	0.04	14.22	13.15	10.42	7.58	6.12	6.11	6.17	6.50	5.31
M2	0.04	9.03	9.06	8.60	7.84	7.05	9.18	7.79	8.89	7.23
M3	0.04	31.02	28.52	24.31	21.48	18.16	22.47	18.40	19.52	14.56
M4	0.04	21.70	21.76	18.90	17.80	15.31	19.42	13.89	16.98	11.87
M5	0.04	29.05	32.64	34.43	31.74	30.17	29.69	32.23	33.43	31.14
Social Exclusion										
S1	0.03	12.69	13.76	13.62	14.98	14.64	17.66	20.70	17.92	16.32
S2	0.03	38.61	36.40	34.14	33.11	32.86	32.46	28.06	28.94	29.50
S3	0.03	24.40	22.47	14.04	12.11	12.82	13.19	13.66	15.28	13.35
S4	0.03	27.21	29.61	20.29	16.98	17.54	19.58	18.14	19.82	14.43
S5	0.03	28.25	25.39	18.06	10.08	7.20	6.53	6.35	4.80	2.60
S6	0.03	24.01	24.39	23.78	23.13	22.89	23.45	23.59	23.31	21.60

Source: Authors' own estimations

Table A.3 Multidimensional poverty estimations

Year	Number of poor (million)	H (%)	A (%)	M (%)
2014	32,699,498	43.2 0.005	50.4 0.002	21.8 0.003
2015	33,220,503	43.5 (.005)	49.7 (.002)	21.6 (.003)
2016	29,764,250	38.6 0.005	48.2 0.002	18.6 0.002
2017	28,074,940	35.6 (.005)	47.4 (.002)	16.9 (.002)
2018	27,039,299	33.9 (.005)	47.1 (.002)	16 (.002)
2019	28,167,434	34.9 (.004)	47.1 (.002)	16.4 (.002)
2020	25,871,753	31.6 (.004)	46.2 (.002)	14.6 (.002)
2021	26,083,059	31.5 (.004)	46.5 (.002)	14.6 (.002)
2022	24,296,049	29.1 (.004)	45.4 (.002)	13.2 (.002)

Note: Standard errors are in parentheses. *H* is the headcount ratio, *A* is the average deprivation score of the poor, and *M* is the adjusted headcount ratio (aka multidimensional poverty index).
Source: Authors' own estimations

Table A.4 Contribution of dimensions

Dimension	2014	2015	2016	2017	2018	2019	2020	2021	2022
Education	.291	.291	.309	.316	.313	.303	.309	.294	.307
Health	.231	.233	.221	.226	.237	.238	.230	.253	.253
Housing conditions	.153	.157	.164	.167	.167	.164	.163	.151	.161
Material deprivation	.146	.146	.147	.144	.135	.145	.141	.147	.135
Social exclusion	.179	.173	.158	.148	.148	.151	.157	.155	.145

Source: Authors' own estimations

Table A.5 Multidimensional poverty estimates through various cut-offs

Cut-off	1/4	1/3	1/2	1/4	1/3	1/2
Year	**H (%)**			**M (%)**		
2014	54.7	43.2	19.8	25.1	21.8	12.3
	0.004	0.005	0.004	0.002	0.003	0.003
2015	55.1	43.5	19.4	25	21.6	11.9
	(.004)	(.005)	(.004)	(.002)	(.003)	(.003)
2016	50.3	38.6	15.7	22	18.6	9.4
	(.005)	(.005)	(.004)	(.002)	(.002)	(.002)
2017	47.6	35.6	13	20.3	16.9	7.8
	0.005	0.005	0.004	0.002	0.002	0.002
2018	45.9	33.9	12.2	19.4	16	7.2
	(.005)	(.005)	(.003)	(.002)	(.002)	(.002)
2019	47	34.9	12.3	19.9	16.4	7.4
	(.004)	(.004)	(.003)	(.002)	(.002)	(.002)
2020	43	31.6	10.5	17.9	14.6	6.1
	(.004)	(.004)	(.003)	(.002)	(.002)	(.002)
2021	43.8	31.5	11	18.2	14.6	6.5
	(.004)	(.004)	(.003)	(.002)	(.002)	(.002)
2022	41	29.1	8.8	16.6	13.2	5.1
	(.004)	(.004)	(.003)	(.002)	(.002)	(.002)

Note: Estimations using the ½ poverty cut-off can be considered as extreme poverty, while those using the ¼ cut-off also cover the population who are not in multidimensional poverty -according to the standard 1/3 cut-off- but at risk of poverty.
Source: Authors' own estimations

Table A.6 Summary statistics

Variable	Observation	Mean	Std. dev.	Min	Max
log($GDP_{industry}$)	234	9.215	0.910	7.078	11.625
log($GDP_{services}$)	234	9.863	0.648	8.634	12.134
log($GDP_{agriculture}$)	234	8.117	1.013	4.127	10.265
unemployment	234	0.109	0.05	0.034	0.335
exports rate	234	0.135	0.109	0.004	0.519
imports rate	234	0.128	0.130	0.005	0.647
log(credits)	234	9.709	0.577	8.603	11.427
log(social assistance)	234	4.829	0.322	3.856	5.584
Gini	234	0.356	0.032	0.281	0.451
female labor force participation	234	0.320	0.064	0.122	0.442
early motherhood	234	0.011	0.007	0.002	0.039
net migration rate	234	-0.844	10.152	-35.15	60.26
student per teacher	234	16.641	2.52	13	25

Figure A.1 NUTS-2 regions map