

MATERIAL STANDARD OF LIVING AND ENERGY POVERTY IN BULGARIA: STATE AND DEVELOPMENT

The report examines the territorial disparities in the standard of living at the level of European Union, regions and districts in Bulgaria. The standard of living is defined and assessed from the point of view of material living conditions, which include a number of indicators grouped in three thematic areas: economic development, income and consumption, inequality and poverty. Appropriate statistical indicators are used to assess disparities, and a specific methodology is applied for the assessment of the standard of living, that allows territorial units to be ranked according to the distance from the best value. The results of the empirical study for 2010-2017 show: (a) a low level of the standard of living in Bulgaria compared to the EU countries (28); (b) the disparities between the regions in the country are slightly diminishing and between the districts are preserved; (c) there are significant changes in the ranking of the regions and the districts. Energy poverty is studied and assessed on the basis of indicators identified by the "expenditure method" and the so-called "consensual method". The results for 2014-2016 show: (a) a growing range of energy poverty across all indicators; (b) Bulgaria is lagging behind the other EU member states in limiting energy poverty.

JEL: C43; I31; I32; I38; H41; H55; R11; R13

Introduction

The assessment of the standard of living of the population has been a subject of many studies over the last few decades. There is no single opinion in the literature on the conceptual nature of the definition "standard of living" and the methodological toolbox for its measuring. The common between the different definitions is that they define the standard of living as a multi-dimensional category that characterizes the degree of satisfaction with the daily needs of the population (material, financial and social). Differences relate to the scope of the aspects involved and the assessment methodology. In most studies, the living standard is considered in the light of material and financial aspects (income levels and income distribution, consumption and poverty levels (Corlett, Clarke, 2017; Atkinson, Marlier, 2010; Marinov, 2017, etc.). In other studies, the scope of the

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definition and measurement of the standard of living is expanded by including social and political aspects (access to education and health, social security, political freedom, etc.). The latter ensures a more complete presentation and assessment of the living standard.

With regard to assessment and/or measurement of the standard of living, there are also methodological differences that can generally be grouped into two groups. The first group is based on the identification of a set of indicators that are considered to reflect the standard of living to some extent. This group comprises almost all studies of the standard of living in national and international aspects. The second group of studies is based on the calculation of a composite index of the standard of living (welfare), which is determined on the basis of the indices of the statistical indicators included in the respective study. For this purpose, specific methodologies are developed which aim at classifying the individual indicators according to their weight in determining the standard of living (Sharpe, Arsenault, 2009; Osberg, Sharpe, 2009; Shopov, Tzanov, 2015).

This report studies the standard of living and the energy poverty of the population in Bulgaria. The standard of living is considered and assessed from the point of view of material welfare and its distribution. For this purpose, a number of indicators were selected, grouped into three thematic areas. The assessments of material standard of living are reviewed in national and territorial aspects. At a national level, the standard of living is studied in the context of the disparities across the countries in the European Union (EU), and at territorial level, disparities are assessed by regions (NUTS 2) and by districts (NUTS 3). The assessments are based on available and regular statistical data from the National Statistical Institute (NSI) and Eurostat.

The energy poverty of households is examined through four indicators defined by the “expenditure method” and one indicator calculated on the basis of the subjective/consensual method. Expenditure indicators reflect the *affordability* of energy prices for households depending on their income; they measure the *vulnerability* of energy consumers to the level of prices and price fluctuations in the context of households' disposable incomes and incurred costs. The indicators below are interpreted as measures of energy poverty precisely in this aspect. The subjective indicator takes into account also other aspects of this poverty related to housing conditions.

1. Assessment of the material standard of living (2010-2017)

1.1. Indicators and assessment methodology

The selection of the indicators that describe the standard of living of the population has been made in order to reflect the material living conditions and the distribution relationships. National statistics generate a large number of such indicators, among which those of a general nature are selected. The selected indicators are grouped into three thematic areas as follows:

Thematic area 1 “Economic development”:

- Gross domestic product (GDP) per capita – BGN (euro).

The economic development, measured by GDP per capita, gives an idea of the newly created value of goods and services distributed equally among the members of the respective territorial unit. This indicator relates directly to the standard of living in its material dimension. GDP growth means first, offering more goods and services to the population, and second, creating greater opportunities for their consumption.

Thematic area 2 „Incomes and consumption“:

- Total income per household member – BGN (euro).
- Total costs per household member – BGN (euro).
- Average wage – BGN.

The indicators of income and costs per household member are key indicators for assessing the standard of living. Total incomes form the purchasing power of household members in the individual territorial units. The level of consumption is measured by the indicator "Total cost per household member". It includes all costs for purchasing goods and services, incl. domestic consumption within the household. Since both indicators include all types of income and consumer cost, it may be considered that they describe adequately the overall purchasing power and consumption level. The average wage reflects, on the one hand, the cost of hired labour and, on the other, determines the quantitative and structural characteristics of household incomes.

Thematic area 3 „Inequality and poverty“:

- Relative share of the population at risk of poverty – %.
- Population at risk of poverty or social exclusion – %.
- Inequality in incomes distribution – Gini coefficient.
- The indicators of inequality and poverty give an idea of the social divide in society.

They have an important role in assessing the standard of living because they describe distributive and redistributive relationships in society. The indicators selected reflect different aspects of income inequality, poverty and social inclusion. The "Relative share of the population at risk of poverty" indicates how much of the population lives below the poverty line.³ Estimates are derived on the basis of the respective poverty line by territorial units. On the other hand, the indicator "Population at risk of poverty or social exclusion" is a summary measure of the share of the population at risk of social exclusion. It is characterized as a multi-dimensional indicator that combines three basic factors: poverty level, material deprivation and low labour intensity of the working-age population. The Gini coefficient measures the degree of inequality in the distribution of household incomes.

The quantitative measures of the standard of living are derived on the basis of a procedure for scaling (standardization, harmonization) all indicators that form the standard of living. This way, all indicators are matched to the same scale. The standardization of the indicators is performed as the value of an indicator in one territorial unit is referred to the maximum

³ Poverty line is determined at 60% of the median net equivalised income.

value of the same indicator in the total set of territorial units. For this purpose, the following formula is used:

$$H_{ij} = \frac{I_{ij}}{\max(I_{ij})} * 100, \quad (1)$$

where H_{ij} is the standardized measure of the i indicator in j territorial unit, I_{ij} – the value of the i -th indicator in j territorial unit, $\max(I_{ij})$ – maximum value of the indicator in the respective group of territorial units, i – number of indicators, j – number of territorial units⁴.

When the increase in an indicator leads to a decrease in the standard of living (as is the case for the indicators in thematic area 3 "Inequality and Poverty"), formula (1) should be adjusted to obtain comparable (harmonized) results. In this case the following formula is used:

$$H_{ij} = \frac{\max(I_{ij}) - I_{ij}}{\max(I_{ij})} * 100, \quad (2)$$

The calculation procedure consists in the following: first, the maximum value of the indicator ($\max(I_{ij})$) is selected among all monitored territorial units; second, the difference between the maximum and the current value of the indicator is calculated; and third, the obtained difference is divided by the maximum value.

The two formulas for standardizing the indicators are fully equivalent, but are used in two different situations. Formula (1) applies when the changes of the indicator and the standard of living are unilateral, whereas formula (2) is used when the direction of change is different. Thus, the levels of each indicator are expressed as a percentage, with the top-level unit receiving 100%, and the rest – a percentage equal to the ratio of their value to the highest value.

On the basis of the standardized indicators, two types of aggregate measures of the standard of living may be assessed. The first measure evaluates the living standard in each thematic area⁵, and the second provides an aggregate assessment of the standard of living for each territorial unit, comprising all indicators. Both types of aggregate measures are calculated as average unweights magnitude of the individual assessments H_{ij} , multiplied by n number of individual indicators⁶. These measures are average arithmetic values of the constituent standardized indicators, expressed in percentage. The assessments show the remoteness of a territorial unit from the benchmark, represented by the best scores of the individual indicators. The territorial units are ranked in descending order.

The ranking of the territorial units allows three groups to be distinguished. The first covers those territorial units whose aggregate assessments are above the average level. The second group covers those whose aggregate scores are between the average and the so-called "critical threshold," defined as the difference between the average score and half the difference between the worst and the average score. The third group includes the territorial units whose scores are below the critical threshold.

⁴ The average level of the total set of units is added to the territorial units with the purpose of comparability between territorial indicators and average level.

⁵ Calculated on the basis of the indicators included in the thematic area.

⁶ Known as the method of Bennett.

1.2. Aggregate assessments of the material standard of living

1.2.1. Standard of living in Bulgaria and in the EC member states

The available information from Eurostat has been used to assess the standard of living of the EU countries. The assessments are based on six indicators, as the data for the indicator "Average wage" does not cover the entire studied period.⁷ Therefore, this indicator was not included in the assessment.

The ranking of the EU countries according to the magnitude of the aggregated assessments of the material standard of living for 2010, 2013 and 2017 is shown in Table 1. The ranking and the changes in the development of living standard over the period under consideration have several features.

Table 1

Aggregate assessment of the material standard of living of EC member states (%)

2010		2013		2017	
Luxembourg	90.8	Luxembourg	86.8	Luxembourg	81.8
Denmark	70.2	Denmark	71.8	Denmark	69.5
Netherlands	68.9	Finland	67.7	Finland	65.5
Finland	65.1	Sweden	67.4	Sweden	62.2
Sweden	63.6	Netherlands	67.4	Netherlands	62.0
Austria	61.2	Austria	62.9	Austria	61.5
Belgium	59.5	Belgium	60.0	Ireland	61.3
France	57.8	France	56.6	Belgium	57.2
Germany	56.5	Germany	55.8	Germany	56.6
Ireland	56.1	United Kingdom	53.5	France	56.4
United Kingdom	50.0	Ireland	52.8	United Kingdom	53.6
Slovenia	48.8	Czechia	47.3	Czechia	47.4
Cyprus	47.6	Slovenia	45.3	Slovenia	46.5
Czechia	47.2	EU (28)	45.3	EU (28)	45.6
EU (28)	46.6	Slovakia	41.8	Slovakia	42.3
Italy	45.4	Cyprus	41.3	Malta	42.0
Slovakia	40.1	Italy	40.4	Cyprus	41.4
Malta	39.6	Malta	40.1	Italy	38.8
Spain	37.6	Spain	34.2	Spain	34.0
Greece	35.9	Portugal	28.7	Poland	32.8
Hungary	34.9	Estonia	27.7	Portugal	32.6
Portugal	33.1	Hungary	27.2	Hungary	31.4
Estonia	30.3	Poland	27.1	Estonia	29.6
Poland	25.5	Croatia	23.7	Croatia	25.3
Croatia	22.8	Greece	22.8	Greece	24.3
Lithuania	15.9	Lithuania	20.3	Latvia	22.0
Latvia	14.8	Latvia	18.7	Lithuania	19.7
Romania	11.8	Romania	9.6	Romania	13.9
Bulgaria	9.9	Bulgaria	7.7	Bulgaria	7.0
Coefficient of variation	44.7	Coefficient of variation	47.0	Coefficient of variation	42.5

Source: own calculations based on Eurostat data.

⁷ Available data cover the period 2010-2015.

The first feature is the stability of the positions of the individual countries over the overall analysed period. Differences exist within one or two positions. Also, the scope of the groups with a high, medium and low standard of living remains relatively constant. The group of the leaders includes mainly highly developed countries. Good positions are a result of high GDP per capita and high income and household consumption. It is worth mentioning that this group includes also countries with relatively lower indicators of economic development, income and consumption (the Czech Republic and Slovenia). In this case the good ranking of their standard of living is due to the leading positions in the area of inequality and poverty.⁸ The group with medium scores of the standard of living comprises countries in Southern and Eastern Europe. For most of them, the medium scores are due to the average level of economic development and income (Italy, Spain, Portugal, Malta), while others are due to the relatively low level of inequality and poverty (Estonia, Slovakia, Hungary). The group of countries with the lowest scores of material standard of living consists of six countries throughout the overall period. The composition of the group remained virtually unchanged over the period, with the exception of Greece, which fell into this group in 2013, replacing Poland. Bulgaria ranks last over the whole analysed period. Its scores are two-three times lower than those of the other countries in the group.

The second feature consists in a reduction of the disparities in the living standards of the countries. This process does not flow evenly. The differentiation measured by the coefficient of variation slightly increased (by 2.3 percentage points) over the period 2010-2013, and declined (by 4.5 percentage points) in the period 2013-2017. Over the whole period 2010-2017 the disparities decreased by 2.2 percentage points. A similar situation is observed in the different groups. In the group of countries with a high standard of living the disparities are relatively low and decrease by 3.8 pp. They are the lowest in the group of countries with medium living standard, but the decline was the most pronounced in the period 2013-2017 (of 5.5 pp). The differentiation in the group of countries with a low living standard is relatively high and the decrease in the period 2013-2017 was low (2.4 percentage points).

Concerning the difference between the standard of living in Bulgaria and the other EU countries, different directions of development are observed. Compared to the leading country (Luxembourg), the difference, albeit extremely high, is decreasing. This is due to the quicker diminishing of Luxembourg's assessment rather than to improvement of the standard of living in Bulgaria. The situation is different when comparing to EU average. Differences are increasing, albeit poorly. In 2010, the difference in scores was of 37 p.p. in favour of the EU (28), in 2013 this difference increased to 38 p.p. and reached 39 p.p. in 2017.

The third feature refers to the changes in the countries' standard of living. For most of the countries, the aggregated assessments of the living standard show a decrease. For example, for the period 2010-2013, the scores of more than half of the countries (15 countries) decreased leading to a decrease in the EU (28) average score. In the period 2013-2017, the situation changed as the number of countries with lower scores decreased to 11. For the

⁸ In the area "Inequality and poverty" Czechia occupies a leading position, while Slovenia ranks third after Finland.

overall period 2010-2017, the number of countries with reduced assessment was 15. Bulgaria ranks among the countries with a permanent decrease of the aggregate assessment. Over the same period, its assessment declined by 2.2 percentage points and in the period 2013-2017 the decrease was of 0.7 p.p. Among the countries with a positive growth in the standard of living, UK, the Czech Republic, Ireland, Lithuania, Latvia, Poland, Slovakia, Malta and Croatia stand out.

The described features in the ranking of the countries and the changes in the standard of living give grounds to make several conclusions. First, there are no significant changes in the ranking of the EC countries. The scope and the composition of the groups with high, medium and low standard of living remain almost unchanged. Second, the disparities between the countries, although slightly decreasing, are still significant. Particularly large is the disparity between the group of the leaders and the group of the countries that are lagging behind. Third, compared to the EU countries, Bulgaria is characterized by an extremely low assessment of the standard of living. Moreover, this assessment marks a steady downward trend.

1.2.2. Territorial disparities in the standard of living in Bulgaria

The territorial disparities in the country have been studied at region and district levels. In accordance with the applied methodology, the material standard of living of the territorial units has been assessed on the basis of an aggregate measure which includes the three thematic areas. The aggregate measure is calculated as average arithmetic (unweight) of the summarized assessments of the three thematic areas. Thus, all changes in the indicators that assess the standard of living are reflected in the aggregate assessment.

The ranking of the regions according to the aggregate assessment of the standard of living is shown in Table 2. South-West region had the highest standard of living in the three years. However, compared with 2010, in the next years it lost from its maximum score (100%) due to the deterioration of the situation in the area of poverty and inequality. Since 2013, North Central region has joined the group of leaders, jumping from fourth place in 2010 to second place in 2013 and 2017. The improvement of the standard of living is due to the high scores in thematic areas “Income and consumption” and “Inequality and poverty”. Certain improvement of the standard of living is observed in North-West region as well, but it is due only to the better characteristics of the indicators on poverty and inequality.

The highest decline in the standard of living was registered in South Central region in 2013. Compared to 2010, its aggregate assessment decreased of almost 18 percentage points, placing the region at the bottom of the ranking. The reasons behind this consist in aggravation of the situation in all the three thematic areas. Particularly serious is the situation in the areas of income, consumption, poverty and inequality. In the years of more stable economic development the situation has improved in all areas of the material standard of living and the region reached a position close to the average for the country, but definitely remained below it.

Table 2

Aggregate assessment of the material standard of living by regions (%)

2010		2013		2017	
South-West	100.0	South-West	83.5	South-West	88.9
BULGARIA	61.5	North Central	64.6	North Central	65.7
South Central	59.0	BULGARIA	55.2	BULGARIA	60.8
North-East	54.9	North-East	46.7	North-West	56.0
North Central	48.4	North-West	46.3	South Central	51.8
South-East	47.7	South-East	45.5	North-East	48.8
North-West	44.6	South Central	41.2	South-East	48.8
Coefficient of variation	35.1	Coefficient of variation	29.8	Coefficient of variation	25.8

Source: own calculations.

Disparities in the standard of living of the regions can be considered as moderate with a tendency towards convergence. For the overall period, the coefficient of variation decreased by more than 9 percentage points, most pronounced in the years of economic stagnation (2010-2013). Disparities are seen also within the groups above and below the average. The difference between the aggregate assessments of the two regions above the average was slightly increasing, while the differentiation of those below the average was decreasing. The gap between the aggregate assessment of Bulgaria and the region at the bottom decreased from 17 percentage points in 2010 to 13.9 percentage points in 2013 and 12 p.p. in 2017. Apparently, the convergence was taking place across the regions with relatively low standard of living.

The ranking of the districts by aggregate assessment of their standard of living (Table 3) marks some changes that can be characterized with the following features. First of all, there is a significant change in the number of districts in the individual groups. In the first group, the number of districts decreased from eight in 2010 to five in 2013 and increased to 14 in 2017. Only districts Sofia-city, Blagoevgrad and Rousse retained their positions in the top group over the three monitored years. The rest of the districts moved into lower groups. Two new districts (Gabrovo and Pleven) appeared in the top group in 2013 and remained in the group in 2017. Significant expansion of the group of the leaders was observed in 2017, including districts that regained their initial position (Plovdiv, Pernik, Sofia-region) and new districts from the group at the bottom (Targovishte, Silistra, Yambol and Razgrad).

The group of districts with a critically low standard of living has a steady downward trend. This tendency is most pronounced during the stagnation period (2010-2013), when its number decreased by more than half. In the period of more tangible economic growth (2013-2017), the group shrunk to four districts. Throughout the period under review, districts Lovech, Pazardjik and Sliven remain invariably at the bottom of the ranking.

Table 3

Aggregate assessment of the material standard of living by districts (%)

2010		2013		2017	
District Sofia (city)	90.2	District Sofia (city)	86.3	District Sofia (city)	83.0
District Blagoevgrad	62.1	District Gabrovo	62.8	District Gabrovo	62.4
District Smolyan	57.0	District Rousse	60.0	District Pernik	60.3
District Rousse	56.6	District Blagoevgrad	59.4	District Stara Zagora	59.0
District Pernik	56.0	District Pleven	56.7	District Blagoevgrad	58.9
District Sofia	55.6	BULGARIA	55.2	District Sofia	56.1
District Varna	54.9	District Yabmol	54.9	District Pleven	55.7
District Plovdiv	54.5	District Kustendil	54.8	District Kustendil	54.2
BULGARIA	53.9	District Sofia	54.7	District Razgrad	53.5
District Gabrovo	52.5	District Dobrich	53.9	District Plovdiv	52.6
District Vratsa	52.5	District Plovdiv	53.8	District Targovishte	52.5
District Bourgas	52.2	District Varna	52.9	District Yabmol	52.5
District Stara Zagora	51.6	District Bourgas	52.6	District Silistra	52.3
District Kustendil	50.9	District V. Turnovo	51.8	District Rousse	52.1
District Dobrich	48.0	District Smolyan	51.5	BULGARIA	52.0
District Pleven	47.2	District Stara Zagora	50.5	District Dobrich	50.0
District Haskovo	46.3	District Montana	49.6	District Haskovo	46.8
District Kardjali	46.0	District Razgrad	47.7	District Varna	46.5
District Pazardjik	43.3	District Pernik	47.5	District Smolyan	45.4
District Montana	41.6	District Haskovo	46.9	District Bourgas	44.7
District Sliven	41.4	District Silistra	46.6	District Vratsa	44.5
District Vidin	40.5	District Targovishte	45.1	District V. Turnovo	44.5
District V. Turnovo	40.3	District Vratsa	45.1	District Montana	44.0
District Yabmol	38.8	District Shumen	44.2	District Shumen	41.6
District Razgrad	38.6	District Kardjali	39.2	District Vidin	39.5
District Shumen	37.7	District Lovech	38.1	District Pazardjik	37.3
District Targovishte	37.0	District Vidin	33.7	District Lovech	35.9
District Silistra	36.3	District Sliven	33.6	District Kardjali	34.3
District Lovech	35.1	District Pazardjik	30.1	District Sliven	25.0
Coefficient of variation	22.8	Coefficient of variation	21.6	Coefficient of variation	22.0

Source: own calculations.

Serious shifts are also observed in the group of districts with medium standard of living. Its scope doubled in 2013 and decreased again to ten districts in 2017.

The second feature is the preservation at a relatively low level of the inter-district disparities in the standard of living. The coefficient of variation slightly changes. More significant disparities between districts are observed in the individual groups. There is a tendency for convergence in the top group. Confirmation of this is the following. First, the difference between the aggregate assessments of the leading district (Sofia-city) and the second district (Gabrovo) decreased. This is mainly due to the poorer assessment of Sofia-city. Secondly, the gap between the scores of the top district and the bottom district in the group also declined (from 35.7% in 2010 to 30.9% in 2017). Third, the variations of the

districts around the group's average position decreased (from 18.6% in 2010 to 13.5% in 2017).

In the group of districts with a medium level of standard of living, differences are increasing. The gap increased between the first and the last in the group from 6.5 percentage points in 2010 to 10.5 percentage points in 2017. Although this gap almost doubled, the coefficient of variation slightly increased (from 5.2% in 2010 to 7.2% in 2013 and to 6% in 2017).

In the group of districts with the lowest standard of living, the trend of divergence is clearly pronounced over the analysed period. The gap between the highest and lowest assessment in the group increased from 8.2 p.p. at the beginning of the period (2010) to 12.3 percentage points at the end of the period (2017). The variation between the aggregate assessments of the districts in the group increased more than twice (from 6.1% in 2010 to 14.5% in 2017). Obviously, shrinking the scope of this group is accompanied by an increase in the disparities in the standard of living.

The third feature consists in an improvement of the standard of living in some districts. More significant improvement is observed in the following districts:

- district Gabrovo – it passes from second into the first group, occupying second position after district Sofia-city. This is mainly due to improvements in the areas of income and consumption and inequality and poverty.
- district Pleven – the better position of the district is mainly a result of high scores in the field of inequality and income.
- district Silistra – it demonstrates a smooth and ascending transition from the penultimate position in 2010 through the second group in 2013 to the first group in 2017. The aggregate assessment of the standard of living in the district increased by 16 percentage points throughout the monitored period.
- district Razgrad – it demonstrates a smooth transition from the group of the lagging ones through the group in the middle to the group of the leading districts. The higher aggregated assessment is a consequence of reduced poverty and inequality in the district.

The conclusions to be drawn regarding the driving factors for these significant improvements in some districts are that they are mainly due to improvements of the area "Inequality and poverty" and, to a lesser extent, in "Income and consumption".

The fourth feature concerns the districts with a significant decrease in the aggregate assessment of the standard of living. Compared to 2010, the assessments of nearly half of the districts decreased. Among them, Sliven (16.4 p.p.), Kardzhali (11.6 p.p.), Smolian (11.6 p.p.) and Varna (8.4 p.p.) are among the most depressed districts. Sliven district, although standing at the bottom of the ranking in the overall period, has lost positions due to the strong decline in the areas of income and poverty. The aggregate assessment in the area of income and consumption declined from 76.8% in 2010 to 50.1% in 2017, and

inequality and poverty respectively from 26.1% to 2.1%. Kardzhali dropped down in the ranking mainly as a result of the lower assessment in the area of inequality and poverty⁹. The same reasons are valid for districts Smolyan and Varna. The assessment of inequality and poverty in district Smolyan dropped down by 32 percentage points and that of income and consumption – by 4.3 percentage points. In district Varna the decrease was less pronounced.

The changes in the aggregate assessments of the standard of living can be summarized as follows:

- A decrease of the aggregate assessments is observed in a significant part of the territorial units in the period 2010-2017. In half of the regions (South-West, South Central and North-East) the assessments decreased, the decline being most pronounced in South-West region (11.1 p.p.). The situation is similar at the district level.
- There are significant shifts in the ranking of territorial units at both region and district level – some units demonstrate improvement, while others – worsening.
- Changes in the standard of living of territorial units are mainly due to changes in inequality and poverty and, to a lesser extent, incomes and consumption. Economic development does not have a significant impact on this process, as the assessments in this area are quite constant.
- The disparities in the standard of living by regions and by districts are different. At regional level, they decrease strongly, whereas in the districts they remain almost constant.
- A progress in the positioning of territorial units is mainly observed in those with relatively low economic development but significant improvement of income levels, consumption, poverty and income inequality. Typical examples at the level of the regions are North Central and North-West, and at the level of the districts – Gabrovo, Kardzhali, Silistra and Pernik.

2. Energy poverty in Bulgaria (2014-2016)

Methodology

There is still no official definition of "energy poverty" in Bulgaria, as suggested in Art. 3, item 7 and 8 of the "electricity" Directive 2009/72/EC. The adoption of a definition depends on "who and what" the responsible institutions want it to be focused on, which requires a political decision. In turn, in order to be "informed", the decision should a priori be aware of the likely dimensions of the phenomenon, as well as to take into account the socio-economic characteristics of the country and its experience in the social protection of the poor. Therefore, it would be better to define the concepts related to energy poverty *after*

⁹ The aggregate assessment in thematic area "Inequality and poverty" decreased by 28.5 p.p., and in thematic area "Income and consumption" – by 7.7 p.p.

defining its main dimensions in Bulgaria and summarizing the national experience in providing targeted social allowances for heating. **This approach is applied in this report.**

Several main indicators are used to measure energy poverty¹⁰, based on different methods which may form two groups. The indicators from the first group are determined by the so-called "expenditure method" and **basically reflect the affordability of energy prices for households**, depending on household income. In other words, **they measure the vulnerability of energy customers to the level of prices and their fluctuations in the context of disposable income** and the costs they incur. Some European countries (England) include an indicator of this group in their national definitions of energy poverty. This clarification made, for the purposes of this report **the indicators under consideration are interpreted as indicators/measures of energy poverty strictly in this aspect.** The indicators from the second group, which uses the so-called "consensual method", take into account other aspects of this poverty.

Results

A. Indicators determined through the "expenditure method"

"Ten Percent Rule" (TPR) – it identifies as energy poor those households whose energy costs are above 10% of their disposable income. This method only applies to the lowest three decile groups of households to avoid distortion in relation to high-income groups which do not self-impose restrictions on energy consumption at home and therefore the share of their costs may exceed the adopted threshold. This is one of the most widely used indicators in a number of studies, including in a World Bank report on the dimensions of energy poverty in Bulgaria (World Bank, 2017).

"Relative Poverty Line" (RPL) measures the energy poverty (respectively the affordability of energy prices for the population) based on disposable income after deduction of energy costs, compared to the relative poverty line: a household is considered as energy poor when its disposable income after deduction of energy costs is below the relative poverty line. According to the methodology of Eurostat, in the researches related to statistics on income and living conditions (SILC) the relative poverty line equals 60% of the median equivalised disposable income after social transfers.

The indicator **"Low-Income, High-Cost" (LIHC)** determines a household as energy poor if it meets the following two criteria:

- The household's energy costs are above the median costs.
- The disposable income after deduction of energy costs is below the relative poverty line (as per RPL).

¹⁰ This section has been developed based on mainly the following publications: Thomson, H., C. Snell (2016), p.101-114; Flues, F. and K. van Dender (2017), p. 10-13. The publications of Buzarovski St. (2011), Pye, St., A. Dobbins (2015) have been considered as well.

This indicator for energy poverty was officially adopted by England in 2013, replacing the TPR.

The indicator “**Low-Income, High-Cost-Share**” (LIHCS) determines a household as energy poor if the household meets two criteria as well, but they are the following:

- The share of energy costs is above 10% of the household’s disposable income (as per TPR).
- The disposable income after deduction of energy costs is below the relative poverty line (as per RPL).

This indicator combines the requirements of two others and (as well as the previous one) can be considered as particularly selective, because in order to be classified as energy poor, households need not only to spend a significant portion of their income on energy costs at home, but also to receive low income, so that they fall below the relative poverty line. Its **weakness**, which is common to all analysed indicators which are based on the expenditure method, is that it does not take into account the fact that low-income households restrict themselves to spend money and consume significantly less energy (of about 1/3 according to some estimates) than needed for normal heating and other housing uses. In Bulgaria, for example, in 2015 the weighted energy costs per capita from the first decile were 3.6 times lower than the same costs in the richest decile. In other words, the elasticity of their energy costs is (under pressure) relatively higher in order to meet their other acute basic needs (e.g. food, medicines).

The values of the indicators for Bulgaria in 2014-2016 are shown in Table 4 and illustrated in Figure 1 and Figure 2.

Table 4

Scope of energy poverty in Bulgaria based on expenditure indicators (2014-2016; % of total household number)

	2014				2015			
	TPR	RPL	LIHCS	LIHC	TPR	RPL	LIHCS	LIHC
Decile 1	4.2%	5.0%	4.2%	0.7%	4.7%	6.1%	4.7%	1.4%
Decile 2	4.9%	6.1%	4.9%	1.7%	6.4%	7.1%	5.9%	2.4%
Decile 3	5.4%	7.4%	5.4%	2.4%	6.7%	6.4%	5.3%	2.2%
Decile 4	5.7%	7.6%	5.3%	2.7%	7.0%	4.8%	4.3%	1.7%
Decile 5	5.9%	5.8%	4.4%	2.3%	6.8%	3.9%	3.4%	1.1%
Decile 6	6.9%	4.2%	3.6%	1.7%	6.5%	3.6%	3.2%	1.0%
Decile 7	6.1%	2.2%	2.0%	0.7%	6.3%	1.8%	1.7%	0.8%
Decile 8	6.0%	0.9%	0.9%	0.6%	5.7%	0.6%	0.5%	0.4%
Decile 9	6.3%	0.2%	0.2%	0.1%	5.1%	0.2%	0.2%	0.2%
Decile 10	5.3%	0.0%	0.0%	0.0%	4.0%	0.0%	0.0%	0.0%
All households	56.6%	39.4%	30.9%	12.9%	59.1%	34.5%	29.3%	11.2%
Decile 1-3	14.5%				17.8%			

2016

	TPR	RPL	LIHCS	LIHC
Decile 1	5.7%	6.9%	5.6%	1.0%
Decile 2	7.2%	7.9%	6.7%	2.4%
Decile 3	7.4%	7.7%	6.3%	2.8%
Decile 4	6.1%	5.8%	4.8%	2.1%
Decile 5	6.4%	5.7%	4.8%	2.0%
Decile 6	7.1%	4.6%	4.2%	1.5%
Decile 7	7.2%	3.5%	3.2%	1.3%
Decile 8	5.9%	1.5%	1.4%	1.0%
Decile 9	5.6%	2.0%	1.9%	1.6%
Decile 10	4.9%	0.5%	0.5%	0.5%
All households	63.3%	46.0%	39.5%	16.3%
Decile 1-3	20.2%			

Source: Own calculations performed by s.a. PhD Teodora Peneva based on data from Household Budget Survey in the Republic of Bulgaria, performed by NSI in the respective year.

Figure 1

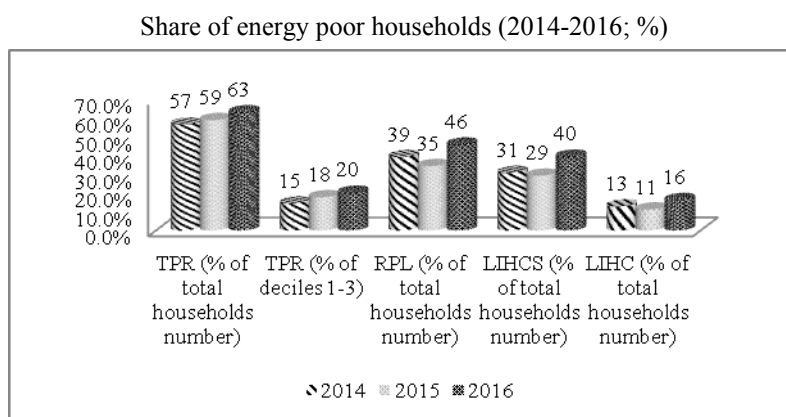
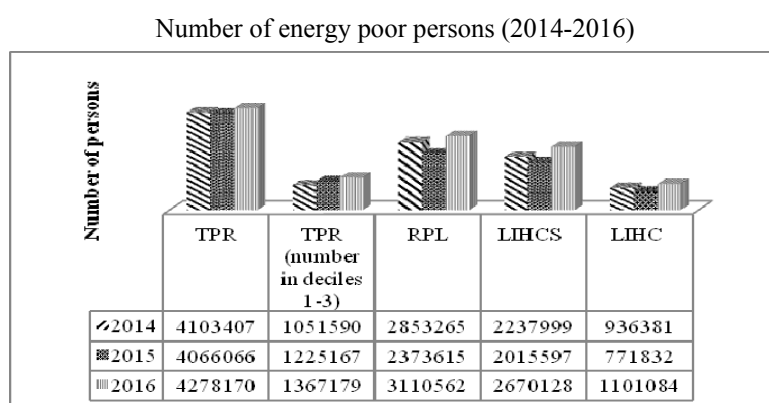


Figure 2



The calculated through the individual indicators assessments differ, but they logically reflect the nature and the heuristic features of each one of the indicators described above.

First, in the analysed period, the scope of energy poverty increased by all indicators – both in relative share and in number households and persons. The following may be considered as main factors:

- An escalation of income inequality demonstrated by an increase of: a) the Gini coefficient from 37% in 2014 to 40,2% in 2016; (b) the ratio between the incomes of the poorest and the richest 20% of households from 7,1 in 2014 to 8,2 in 2016.
- An increase of the relative poverty line from 3910 BGN in 2014 to 4213 BGN in 2016. However, in 2015, a reduction was observed (3698 BGN), which influenced the decline in the values of some indicators against 2014.
- An increase of energy prices – e.g. electricity for consumers of less than 2500 kWh /year of around 6% : from 0,176 kWh in October 2014 to 0,186 kWh two years later.
- Restructuring of the energy costs per decile groups: in 2016 the energy costs in the first two decile groups decreased, while electricity costs increased. In the decile to the sixth, both energy and electricity costs expanded. In the deciles 7-10, the energy costs increased but the electricity costs decreased.
- Faster growth of the incomes in the fifth quintile (22%) compared to the first (20%), which is accompanied by a higher increase in energy costs of the highest income fifth quintile (30%) compared to the energy costs growth of the first bottom quintile (by 11%). The result is deepening differentiation between the two quintiles in terms of energy costs; these costs put more stress on the budgets of low-income households, making energy less accessible to them: in 2016, the share of energy costs in the net income of the first decile was slightly over 18%, while in the last decile it was by almost 10 p.p. lower (8.8%).

The 2015 decline of the values of the indicators which include an assessment against the relative poverty line may be explained mostly with the reduction of its amount set from 3910 BGN in 2014 to 3698 BGN in 2015.

Second, lowest, but also relatively close, are the values of the indicator of TPR, covering the first three lowest income deciles for which it is advisable to apply this indicator, as mentioned above, **as well as** the indicator LIHC¹¹. They show that the scope of energy poverty ranges within 13-20%, i.e. in 2016, according to the TPR indicator, almost every fifth Bulgarian household had a problem in terms of affordability of energy prices and was vulnerable to price changes, which affected more than 1300 thousand people.

¹¹ From a methodological point of view, the values under this indicator may be considered as contingent because: (a) the median of household energy expenditure is calculated on the basis of actual costs incurred without applying an equivalised expenditure scale (similar to the equivalised income scale) that has not yet been defined in Bulgaria and there are no legal standards for minimum necessary energy costs for households with a corresponding equivalised costs scale of these; (b) at the same time, in the second limiter (RPL) an equalized income after deducting household energy consumption is applied.

The inclusion of the results of all deciles (which is doubtful from the methodological point of view) gives a 57% value of the TPR indicator for households whose energy expenditures exceed 10% of their net disposable income in 2014, which in turn coincides with the value of the same indicator in the cited report of the World Bank (57%). In 2016 it increased by 6 p.p.

Third, the values of the indicators RPL and LIHCS are relatively close and comparable: the first indicator varies within 35-46%, and the second – within 29-40%, which means some 3100 thousand energy poor people in 2016 as per the first indicator and around 2670 thousand as per the second indicator.

Fourth, based on the three indicators (RPL, LIHC and LIHCS) that use the relative poverty line, at the end of the period the energy poverty already covered also a small portion of the highest income 10th decile, and in the 8th and 9th deciles it occupied a higher share compared to the previous years (see Table 4).

The empirical results produced, in addition to shaping the quantitative parameters of energy poverty in the context of the affordability of energy prices of households, can support the official institutional choice of one or another indicator for measuring this type of poverty, to be used as a landmark and starting point for elaborating the relevant definitions and national policies in this field.

B. Indicators determined through a subjective/”consensual” method

In addition to the expenditure indicators, an indicator (proposed by Healy, 2011) (Buzarovski, 2011, p. 2) has been calculated through a subjective/”consensual” method. The indicator is based on data from self-evaluation of the population received through empirical sociological surveys within SILC on issues regarding: affordability to pay on time energy bills; quality of dwellings (leaking roof, damp walls, floors or foundation, or rot in window frames of floor); heating in the dwelling during the winter season, etc.

Table 5

Energy poverty rate

	2009	2010	2011	2012	2013	2014	2015
EC-27 (p.p.)	28.6	29.2	29.7	31.3	31.8	30.8	28.7
Bulgaria (p.p.)	98.0	98.3	75.5	76.1	75.5	70.3	67.7
Bulgaria against EC-27:							
Absolute difference (p.p.)	69.4	69.1	45.8	44.8	43.7	39.5	39.0
Ratio	3.42	3.37	2.54	2.43	2.37	2.28	2.36

Source: own calculations based on the method of Healy and primary data of Eurostat for the respective indicators.

The results of the assessment show (see Table 5) that Bulgaria sustains a trend of improvement of the indicator – the energy poverty rate decreased by some 30 p.p. in 2015 against 2009. On the other hand, the distance from the average European rate remains quite significant – over two times. This means that, here again, the country is lagging behind the other EU member states in the efforts to reduce energy poverty.

Conclusion

First, the findings of the study on the material standard of living at territorial level can be summarized in the following key conclusions.

1. The methodology applied provides very good opportunities to rank territorial units according to their distance from the maximum value of the indicators applied. Thus, the ranking of the territorial units by individual indicators depends on the gap between the actual and the highest values of the indicator. The most suitable measure – coefficient of variation – has been used to evaluate the disparities between the territorial units. The methodological instruments applied give acceptable and appropriate assessments of disparities in the ranking of the territorial units according to the indicators of standard of living.
2. Appropriate and logically-based indicators were used for researching the features of the material standard of living that relate directly to the economic development, income, consumption, poverty and inequality. They have been selected in a way to reflect general trends in development without specifying group and intragroup particularities.
3. Compared to the EU member states (28), the standard of living in Bulgaria is at an extremely low level. The assessments mark a stable trend of decrease in the last decade. The aggregate assessments by thematic areas rank the country at the last position, the assessment in the area of inequality and poverty being extremely low.
4. The differences in the aggregate assessments of the standard of living of the territorial units in the Bulgaria show a mixed development over the period analysed. There is a slight tendency towards convergence between regions, while disparities between the districts sustain. In addition, the assessments of a significant proportion of the territorial units have decreased compared to 2010, which is a prerequisite for lowering the standard of living. Despite these unfavourable trends, there has been a decrease in the number of the thematic areas in critical situation.

Secondly, from the energy poverty study, the following conclusions and assessments can be drawn.

1. The outline of the main dimensions of energy poverty in Bulgaria by various indicators enriches the scientific knowledge about it, but also, in terms of policies, it supports the institutions in defining national concepts related to this poverty.
2. In this context, it is necessary to reach a common understanding on a number of methodological issues in calculating the indicators.
3. The range of energy poverty is increasing by all indicators. The fall in 2015 for some of them could be seen as a consequence of the decline in the value of the relative poverty line.
4. Differences in the scope of energy poverty stem from the construction of the individual indicators; at the same time, some of them report relatively close values:

- Under the TPR – for the first 3 deciles, and the LIHC, the values are between 13-20%.
 - Under the RPL and the LIHCS, the values are between 30-46%.
5. At the end of the period, the energy poverty measured by indicators that use the relative poverty line, covers - albeit a very small part – high-income households. The inequality between households in terms of energy costs is deepening – energy consumption puts more stress on the budgets of low-income households, making it less affordable and accessible to them.
 6. Bulgaria is lagging behind the other EU member states in the limitation of the energy poverty.

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