The Level of Housing Conditions in the EU Countries

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Abstract:

Purpose: This article mainly aims to assess the level and identify the differences in terms of housing conditions of the EU population in 2008 and 2019.
Design/Methodology/Approach: The study was based on empirical data obtained from Eurostat, which were processed using basic descriptive statistics methods and taxonomic methods. The presented study required conducting empirical research to achieve the main research objective and to answer research questions. The empirical research consisted of two stages including unidimensional and multidimensional (synthetic) analyses. In the first stage of the research using basic descriptive statistics methods, the level and diversity of housing conditions of the EU population were assessed based on the analysis of selected indicators. In the second stage of the research, due to the complex nature of the studied phenomenon, the selected model method of construction of the synthetic measure was used for assessing the level and diversity of housing conditions of the EU population.
Findings: The study reveals that during the period under review there was a significant improvement and reduction in disproportions concerning the level of housing conditions of the EU population. The highest level of housing conditions was observed in Finland, while the lowest in Greece. The level of housing conditions is significantly higher in the Central Western European and Scandinavian countries.
Practical Implications: The results of the conducted empirical research are of both cognitive and applied nature to create an appropriate cohesion policy in the European Union. The implementation of cohesion policy in the EU is not possible without efforts to reduce economic poverty, including housing poverty. Therefore, it is of great importance to monitor the level of housing conditions in each country to create appropriate social policies.
Originality/value: The results of the conducted research and of theoretical considerations included in this article complement previous research in the field of the assessment of living standards and housing conditions of the EU population.

Keywords: Housing conditions, housing deprivation, housing poverty, European Union countries, TOPSIS method.

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1. Introduction

Living standards and social inequality have always been the subject of economic analyses and research. They are key concepts used in politics and social development strategies. This is due to the still significant disparities in living standards and material deprivation of the EU population (Dudek, 2019; Łuczak and Kalinowski, 2020). Hence there are attempts to create a broader system for measuring these phenomena. The authors of the Report of the Commission on the Measurement of Economic Performance and Social Progress point out that "well-being has many dimensions; however, its material dimension – standard of living – is a good starting point" (Stiglitz *et al.,* 2013). Housing conditions are one of the most important determinants of the living standards of the population, as indicated among other things by studies conducted by Kozera (2016), Spirkova *et al.* (2015), Głowicka-Wołoszyn *et al.* (2018), Łuczak and Kalinowski (2020).

Housing is an essential element of the material sphere of human life and it is one of the most important aspects of the existence and functioning of households. First and foremost, housing meets the basic needs of household members by providing shelter and a sense of security without which the full development of higher-order needs is not possible. According to WHO (2013), citizens of European countries spend approximately 90% of their time indoors and 2/3 of that time they spend in their dwellings. In addition to meeting the physiological needs underlying the Maslow's (1970) hierarchy of needs, a dwelling also provides a means to meet all of the higher-order needs of household members. This is because it is also a place of work, entertainment and leisure, especially now during the COVID-19 pandemic. The inability to meet housing needs at an appropriate level results in housing poverty (Stephens and van Steen, 2011; Ulman, 2011).

The importance of housing needs in society makes housing conditions particularly significant from the perspective of social policies and shaping living conditions (Matel, 2019). The need for housing is universal and remains crucial for people throughout their lives. Failure to meet this need affects many areas of human life, hence many legal regulations raise the issue of the right to live in decent housing conditions (UN Universal Declaration of Human Rights, EU International Covenant on Fundamental Rights, Council of Europe's European Social Charter and others). The implementation of cohesion policy in the EU is not possible without efforts to reduce economic poverty, including housing poverty. Therefore, it is of great importance to monitor the level of housing conditions in each country to create appropriate social policies.

This article mainly aims to assess the level and identify the differences in terms of housing conditions of the EU population in 2008 and 2019. The conducted empirical research aimed to answer important questions concerning the differences in terms of the level of housing conditions of the EU population, namely: Where in the European Community are housing conditions rated high and low? What is the housing condition

index (HCI) in EU countries? How has HCI changed in 2019 compared to 2008? Where is the highest rate of change in the level of housing conditions of the EU population and what are the reasons for this?

The scope of the data used in this study included 2008, a year in which there were small negative effects of the economic crisis. The said crisis was inextricably linked to housing, it affected real estate markets and the construction sector, and its negative impact was most evident in the case of mortgage foreclosures, evictions and homelessness (Eurofound, 2016). In contrast, 2019 marked the end of a period of stabilisation and overcoming the economic crisis. That year was a caesura after which the negative effects of the COVID-19 pandemic were visible.

2. Housing Conditions – Theoretical Connotations

In recent years there has been a growing interest in issues concerning the living conditions, living standards and quality of life of the population. The differences in terms of living standards and social inequality have become an enduring topic not only of economic analyses and scientific research, but also of lively public and political debates. In fact, decent living conditions, high living standards and high quality of life of the population are considered the main goal of socio-economic development, both at the local, national and international levels. Living conditions, living standards and quality of life are the categories within which the satisfaction of household needs, including housing needs, is measured.

The Greek philosopher Epicurus, considering the naturalness of needs, their necessity and their importance in human life, distinguished three basic categories of needs: natural and necessary (e.g., need for food and protection), natural but unnecessary (e.g., sexual needs), unnatural and unnecessary (e.g., need for popularity) (Zalega, 2008). However, one of the most widely recognised models of the hierarchy of human needs in the literature is the theory of human motivation proposed by Abraham H. Maslow (1908-1970) (known as the Maslow's hierarchy of needs). Maslow (1970) divided needs according to the degree of indispensability of their satisfaction. He distinguished five groups of needs, which he ranked from most important to less important (secondary needs). Using this criterion, he considered physiological needs to be the most urgent, the satisfaction of which determines the satisfaction of higher-order needs, i.e. needs for belonging and love, recognition, self-actualisation. Basic needs are met first through the consumption of necessities.

Once these needs are relatively satisfied, there is a desire to live at a higher quality level, which requires qualitative changes in consumption and the acquisition of further luxury goods and services. Maslow further added the following two groups of higher-order needs – the need for knowledge and understanding and the need for aesthetic experience. Although Maslow's concept was criticised (Barling, 1977; Hanley and Abell, 2002), it can be assumed that there are basic and higher-order needs with which housing needs are identified.

The issue of hierarchy of needs has also been addressed in economic sciences. Marshall (1925) identified the following needs in the first step, satiation of hunger, clothing, housing, warmth and light. Then he listed social needs and those arising from human psychological characteristics. As a criterion for their hierarchy, he adopted the natural order of their occurrence. Given the aforementioned selected classifications of needs, it is evident that housing needs are classified as basic needs; however, they can satisfy higher-order needs. On the one hand, housing needs are universal, accompanying all people throughout their lives regardless of their socio-economic situation. On the other hand, their satisfaction is capital-intensive, which implies difficulties in terms of their full satisfaction in society. The housing needs can be defined as those needs that arise from the desire to live (dwell) in decent housing conditions (Andrzejewski, 1987; Wilczek, 2013).

Housing is an essential element of the material sphere of human life and it is one of the most important aspects of the existence and functioning of households. It plays a significant role in the life of the family, as it provides shelter and a sense of security. Therefore, housing meets basic needs of households, without which it is impossible to fully develop higher-order needs. This is because it lays the foundations for the proper development of the household, family life and social life. A dwelling is, among other things, a place of work, entertainment, leisure and recovery time. This means that owning a dwelling simultaneously provides opportunities for higher-order needs, e.g., aesthetic experience or prestige (Andrzejewski, 2005; Pronovost, 2006). Housing conditions thus have a significant impact on the standard of living of both the individual and the household (Kozera, 2016; Głowicka-Wołoszyn *et al.,* 2018).

Housing conditions are an essential element in assessing the living conditions of households, as the need for shelter and independence from external natural conditions have accompanied humans since the dawn of time. The way of satisfying housing needs has changed with the development of civilisation and socio-economic development. Hence, the functions of housing have expanded. According to Andrzejewski (2005), the scope and intensity of the functions of housing also depend on the geographical and climatic environment, the level of cultural development and the forms of social life. These functions are dichotomously divided by Andrzejewski (1979) into those provided in the sphere of microsocial processes and in the sphere of macrosocial processes.

According to the microeconomic approach, housing and housing environment significantly affect, among other things, the normal development of household members, their physical and mental health status, as well as they frequently determine the decision about having of children, their upbringing and education. According to the macroeconomic approach, housing and housing services not only are the object of consumption, but they also determine the level and development of consumption of durable goods. Andrzejewski (1979) also mentions the importance of housing conditions in the process of population reproduction. In contrast, Wilczek (2014) and Kolman (2009) list as many as six functions of housing. These include protective,

biological, social, humanistic, cultural and educational, and economic functions. In addition to protection and rest, housing assumes functions that are essential to the maintenance of humankind and the development of human personality.

Housing also increasingly meets both individual and social higher-order needs. This is because housing becomes a place that is also a focus for both educational and cultural functions such as learning, play, entertainment, neighborhood relations, etc. (Andrzejewski, 2005). Satisfying needs, not only basic ones but also higher-order needs (e.g., in the area of recreation and leisure) is possible due to the fact that dwellings are equipped with durable goods. Pronovost (2006) points out that today's dwellings, as they are equipped with durable goods, begin to fulfill many new social functions. They become, among other things, "places of art consumption," a substitute for movie theaters, a place of education and recreation. The provision of dwellings with durable goods is significantly influenced by globalisation, technological and technical progress, which leads to the modernisation of goods constituting durable household equipment.

The basic tenets of housing improvement include improved housing accessibility and affordability (De Decker and Dewilde, 2010). In addition to considerations of housing accessibility and affordability, the quality of the housing stock is also of great importance. The inability to meet housing needs at an appropriate level results in housing poverty, which implies lower levels of health and well-being, and increases the risk of poverty and social exclusion (Kozera *et al.,* 2017; Stephens and van Steen, 2011). Therefore, conducting an effective housing policy and developing its perspective for the subsequent years is extremely important for every country (Špirková *et al.,* 2017). Action in this regard is also taken in the EU, although housing policy is the prerogative of national governments rather than a specific EU competence (Eurofound, 2016).

Poverty is most frequently associated with economic poverty; the issue of housing poverty is much less frequently addressed (Kozera, 2016; Kozera *et al.,* 2017; Kurowski and Broda-Wysocki, 2017; Szamrej-Baran, 2018; Sikora-Fernandez, 2018). This is because this issue is frequently marginalised, associated with homelessness rather than with poor or even very poor housing conditions. Housing poverty, as noted by Kozera *et al.* (2017), should not only and solely be equated with the situation of "no roof over one's head", i.e. with homelessness, but it should also be considered as deficiencies (insufficiency) of housing conditions in terms of technical condition and housing equipment (Kozera *et al.,* 2017).

Housing poverty can thus be defined as the inability to meet housing needs at an appropriate level (Stephens and van Steen, 2011; Ulman and Ćwiek, 2020). The issue of household housing conditions is increasingly being addressed in terms of fuel poverty (Szamrej-Baran, 2017; Kurowski and Broda-Wysocki, 2017). Fuel poverty occurs when households encounter problems with meeting basic energy needs, which include maintaining a comfortable temperature in a dwelling, its lighting, as well as

other activities that aim to meet basic needs of biological and social functioning of household members (Boardman, 1991).

3. Research Methodology

The research concerning the assessment of the level of housing conditions of the EU population was based on the data obtained from the *European Survey of Income and Living Conditions* (EU-SILC), downloaded from Eurostat (accessed on 27 January 2021). This survey provides data used for monitoring the Europe 2020 strategy for smart, sustainable and inclusive economic growth. Poverty reduction and social exclusion reduction are essential priorities for this strategy.

Empirical research was required to achieve the main research objective and to answer research questions. It consisted of two stages including unidimensional and multidimensional (synthetic) analyses. In the first stage of the research using basic descriptive statistics methods, the level and diversity of housing conditions of the EU population were assessed based on the analysis of selected indicators. In the second stage of the research, due to the complex nature of the studied phenomenon, the selected model method of construction of the synthetic measure was used for assessing the level and diversity of housing conditions of the EU population. The procedure for building the synthetic feature included six steps, which are presented in Table 1.

The first step in constructing the synthetic feature included choosing the simple features describing the EU countries selected (based on substantive and statistical criteria), as well as determining their preference directions pertaining to the general criterion analysed (i.e. the level of housing conditions). Based on substantive reasons and the ability to access complete statistical data to evaluate the complex phenomenon under study, a set of 14 simple features was proposed. The presented study considers not only quantitative characteristics but also qualitative ones defining the housing conditions of the EU population.

The proposed simple features included an average number of rooms per person (x_1), overcrowding rate (x_2), share of housing costs in disposable household income (%) (x_3), housing cost overburden rate (%) (x_4), share of total population having neither a bath, nor a shower in their dwelling (%) (x_5), share of total population not having indoor flushing toilet for the sole use of their household (%) (x_6), share of total population living in a dwelling with a leaking roof, damp walls, floors or foundations or rot in window frames of floor (%) (x_7), persons who cannot afford colour television (%) (x_8), persons who cannot afford a computer (%) (x_9), persons who cannot afford a washing machine (%) (x_{10}), share of total population considering their dwelling as too dark (%) (x_{11}), pollution, grime or other environmental problems (%) (x_{12}), exposure to air pollution by particulate matter (%) (x_{13}), severe housing deprivation rate (x_{14}) and inability to keep home adequately warm (%) (x_{15}). The collected simple features were further statistically verified. Due to the high degree of correlation with other simple features, traits x_2, x_5, x_{10}, x_{13}, x_{13} and x_{15} were rejected from further study.

Table 1. *Steps in the construction of the synthetic measure of the level of housing conditions of the EU population using the TOPSIS method.*

Steps	Description of steps	Calculation formulas
Selection of simple features for research	Substantive selection of simple features for research and their verification in terms of statistics	$\times$
Normalisation of values for simple features	Using the procedure of zero unitarisation	$z_{ik} = \dfrac{x_{ik} - \bar{x}_k}{s_k},$
Determining the coordinates of model objects for the positive ideal and the negative ideal of development	The coordinates of the positive ideal (A^+) and the negative ideal of development (A^-) are determined as maximum and minimum values respectively, in a set of normalised values of simple features (excluding outliers and extreme values)	$A_k^+ = \begin{cases} \max\limits_{i=1,...,N}(z_{ik}), \text{ if } z_{ik} \in \left[Q_{1k} - 1{,}5 \cdot IQR_k, Q_{3k} + 1{,}5 \cdot IQR_k\right] \text{ for } i \in [1,...,N], \\ Q_{3k} + 1{,}5 \cdot IQR_k, \text{ if } \max\limits_{i=1,...,N}(z_{ik}) > Q_{3k} + 1{,}5 \cdot IQR_k \end{cases}$ $A_k^- = \begin{cases} \min\limits_{i=1,...,N}(z_{ik}), \text{ if } z_{ik} \in \left[Q_{1k} - 1{,}5 \cdot IQR_k, Q_{3k} + 1{,}5 \cdot IQR_k\right] \text{ for } i \in [1,...,N], \\ Q_{1k} - 1{,}5 \cdot IQR_k, \text{ if } \min\limits_{i=1,...,N}(z_{ik}) < Q_{1k} - 1{,}5 \cdot IQR_k \end{cases}$
Calculating the distance of each object from the positive and negative ideal of development	Calculating the distance of each assessed i-th multi-feature object from the development pattern and anti-pattern using the Euclidean distance With the use of Euclidean distances from the	$d_i^+ = \sqrt{\sum\limits_{k=1}^{K}(z_{ik} - z_k^+)^2}$, $d_i^- = \sqrt{\sum\limits_{k=1}^{K}(z_{ik} - z_k^-)^2}$
Calculating the value of the synthetic measure	positive (d_i^+) and negative ideal of development (d_i^+)	$S_i = \dfrac{d_i^-}{d_i^- + d_i^+}$

Note: *where: x_{ik} – the value of the k-th trait in the i-th object (country), $\bar{x}_k, s_k$ – the arithmetic mean and standard deviation for the k-th value of the trait, respectively; z_{ik} – normalised values of the k-th trait in the i-th object; Q_{1k}, Q_{3k} – the first and third quartile of the value of the k-th the trait, respectively; IQR_k – quartile deviation of the k-th value of the trait.*
Source: *Own elaboration based on Wysocki (2010), Kozera and Wysocki (2016), Głowicka-Wołoszyn and Wysocki (2020).*

In the next step (II), the classical standardisation procedure was applied to normalise the values of simple features. The procedure for normalising simple feature values was performed for both 2008 and 2019 data (object-years) to ensure comparability between the obtained research results in years under consideration. Step III includeddetermining the coordinates of the model objects – the positive and negative ideal of development. They are typically defined as the maximum and minimum values, respectively, in a set of normalised values of simple features. However, real data sets may also contain unusual feature values – outliers and extremes – which may result from the specificity of the examined phenomenon. This is the case with the assessment of the level of housing conditions of the EU population. Because these

observations may have a significant impact on results of the analysis, they require special attention (Głowicka-Wołoszyn and Wysocki, 2020). Thus, the coordinates of the positive (A^+) and negative ideal (A^-) of development were determined as the maximum and minimum values, respectively, in a set of normalised values of simple features, excluding outliers and extreme values. Since model values in the object linear ordering methods are determined separately for each feature, a one-dimensional approach to identifying outliers was used in the research, i.e. the quartile criterion. The values of a single feature are considered an outlier if they are outside the following range: $[Q_{1k} - 1{,}5 \cdot IQR_k, Q_{3k} + 1{,}5 \cdot IQR_k]$ (Table 1).

The coordinates of model objects were the basis for calculating the distance of each analysed entity (country) from the positive and negative ideal of development (step IV) using Euclidean distances. In the last step – step V – the values of the synthetic measure (S_i) of the level of housing conditions of the EU population were constructed based on the estimated Euclidean distances using the TOPSIS method (with $0 \leq S_i \leq 1$) (Table 1). Based on the values of the constructed synthetic measure, a ranking of countries was made as well as their typological classification according to the level of housing conditions of the EU population.

4. Results

Housing conditions are a multidimensional phenomenon. There are many indicators and criteria that can be used to analyse and assess the housing situation of the population in different countries. Those include, i.a., the average number of rooms per capita, the overcrowding rate, the housing deprivation rate or the equipment degree in a dwelling along with technical and sanitary installations and durable goods. Satisfaction with housing conditions is also influenced by the surroundings of the dwelling, satisfaction with good economic infrastructure, i.e. access to the retail and service network, access to the natural environment, the proximity of recreational areas or green spaces. Moreover, safety at home and the absence of threats such as crime, violence or vandalism are also important when it comes to the proper functioning of the household.

The availability of sufficient space in the dwelling is one of the main indicators that are used to assess housing conditions. European Housing Standards specify the required number of rooms in a dwelling based on the composition of the household . Dwelling units that consist of fewer rooms (below the housing standards) are classified as overcrowded. In 2008, more than 15% (median) of the total population of the European Community lived in overcrowded dwellings, while it was less than 13% of the population in 2019 (Table 2). In 2019, the greatest problems in terms of housing overcrowding were noticed in Romania and Latvia, where over 40% of the total population lived in overcrowded dwellings. At the other extreme, there are countries in which housing overcrowding is less than 5%, i.e., Ireland, Cyprus, Malta, the Netherlands and the United Kingdom. As it can be seen, there is a large discrepancy and the division line seems to run between old and new members of the

EU. In the analysed period, the availability of sufficient space in dwellings has improved and the discrepancy among the EU countries in this respect has decreased. The value of the asymmetry index, which was 0.50 in 2019, indicates that the group of the EU countries was dominated by states with lower values of the household crowding index.

Presently, in developed countries, it is standard for the dwelling to have basic amenities such as a flush toilet for the use of a given household, a shower or a bathtub. In 2019, across the EU, the lack of access to a flush toilet in a dwelling was the case of only 0.5% of the total population (Table 2). There are many countries that are not affected by this phenomenon, however, there are still quite a few regions where the percentage of dwellings without a flush toilet is relatively high. The largest number of dwellings without a flush toilet is found in Romania (over 24%), Bulgaria (nearly 14%) and Lithuania (10%).

An important determinant of good housing conditions and a high standard of living is the ability to use computer equipment, which determines the percentage of people who cannot afford a computer (Table 2). In this respect, the situation of the residents of the EU has improved significantly. In 2008, 6.7% of the total population could not afford a computer while in 2019, the indicator dropped to 2.6%. The situation has undoubtedly been influenced by the changes in the poorest countries of the Community, especially those which, at the beginning of the analysed period, participated in the EU budgeting for the first time. In Romania, the percentage of persons who could afford a computer increased from 64.1% in 2008 to 87.9% in 2019, and in Bulgaria from 69.2% to 87.7%, those were the lowest rates in the entire EU. During the period from 2009 to 2019, the highest dynamics of change of this indicator was observed in Poland (the percentage of persons who could not afford to buy computer equipment decreased almost 6 times), as well as in Greece (5), the Czech Republic and Estonia (4), which was facilitated by the effective use of the EU funds by those countries.

The housing situation of a country is also defined by the housing deprivation rate, which indicates what percentage of the population, apart from the issue of overcrowded housing, suffers from poor technical conditions of dwellings such as lack of toilets, bathtubs or showers, leaking roofs, insufficient light or dampness. In 2008, more than 5% of the total population of the European Union lived in poor housing conditions, in turn, it was less than 3% in 2019. However, the EU countries are highly diversified in this respect, as indicated by high values of coefficient of variation for the housing deprivation rate (Table 2). In 2019, the highest housing deprivation rate was recorded in Romania (14.2% in 2019) and Latvia (12.7% in 2019), where more than 1/10 of the population lived in poor housing conditions.
The issue of housing deprivation is virtually non-existent in countries such as Finland and Ireland. It is important to note that there was an improvement with regards to this indicator over the period from 2008 to 2019. In Bulgaria and Romania, there was a decline in the housing deprivation rate by nearly 15 percentage points, while in

Lithuania, Slovenia and Hungary - by more than 10 percentage points. The above means that the housing conditions in terms of the basic equipment in the dwellings and the technical condition of inhabited buildings have improved.

For a person who decides to buy or rent a place to live, the location and surroundings, including the quality of the natural environment, are as important as the state of the dwelling unit itself. In 2019, more than one-tenth of the total population of the EU was exposed to pollution, dirt and other environmental issues in the area of their residence (Table 2).

Among European countries, Malta (34%) and Germany (over 25%) are the countries with the highest percentage of the population exposed to pollution, dirt and other environmental problems. Rates of exposure to pollution, dirt or other environmental issues were also significantly higher in Greece, Latvia, Lithuania and Slovenia, compared to the average rates in other countries of the European Union. In turn, the high quality of the natural environment in the place of residence was the case of Ireland, Croatia and Sweden, where less than 7% of the total number of residents indicated that they faced problems in their regions.

The issue of housing conditions is more and more often addressed in terms of fuel poverty. Fuel poverty occurs when households encounter problems with meeting basic energy needs, which include maintaining a comfortable temperature in a dwelling, its lighting, as well as other activities that aim to meet basic needs of biological and social functioning of household members (Boardman, 1991). The issue of fuel poverty is also addressed in the *European Union Statistics on Income and Living Conditions* (EU-SILC). The severity of that problem may be proved by the fact that more than 50 million households in Europe experience it (EU Energy Poverty Observatory).

Subjective measures of housing conditions in the context of fuel poverty include, first of all, the proportion of the population unable to heat their dwellings adequately for their needs. In 2008, this indicator for the entire EU was 6%, while it was 5.4% in 2019. The diversification in the European Community with regards to that indicator is high, as can be seen from the value of the range which was over 65% in 2008 and over 28% in 2019 (Table 2).

There are many countries where housing poverty is not an issue, i.a., Austria (1.8%), Finland (1.8%), Slovenia (2.3%), Luxembourg (2.4%), Estonia (2.5%) and Denmark (2.8%). A particularly large problem in terms of the inability to maintain adequate heat in dwellings is still noticed in Bulgaria (over 30% of the total population), in Lithuania (26.7%), Cyprus (21%) and Portugal (18.9%).

The conducted research, with the use of basic methods of descriptive statistics, showed significant differences between the countries of the EU in terms of the housing conditions and their changes in 2019, compared to 2008. As it was already indicated, housing conditions are a complex and multifaceted phenomenon, therefore, in the

second stage of the research, the diversity of the studied phenomenon was assessed in a synthetic manner, based on the values of the synthetic measure calculated with the use of TOPSIS method. The above enabled a linear ordering of the assessed EU countries in terms of the level of housing conditions. Then, five typological classes were determined, reflecting the level of housing conditions of the population in the European Community. The results of the conducted research are presented in Tables 3-5 and Figure 1.

The conducted empirical research, with the use of the synthetic measure, showed that the general level of housing conditions of the population in the European Community increased in 2019, compared to 2008. In 2008, the constructed synthetic measure of the level of housing conditions assumed values from 0.198 for Bulgaria to 0.788 for Ireland. In 2019, the range of its volatility was higher, ranging from 0.373 for Greece to 0.801 for Finland. Hence, the conducted research showed not only an increase in the general level of housing conditions, as evidenced by the increase in the average level of the synthetic measure, but also a reduction in disparities between EU countries in terms of the level of housing conditions. The above is evidenced by the decreasing value of the coefficient of variation for the synthetic measure, which was 26.04% in 2008 and already 14.5% in 2019 (Table 3).

Based on the values of the synthetic measure, countries were ordered in a non-decreasing manner and appropriate ranks were assigned to them. In 2019, compared to 2008, the greatest improvement in the level of housing conditions was observed for Croatia, the Czech Republic and Estonia (an increase by 11, 11 and 10 positions in the ranking, respectively). In the case of those countries, there was a significant drop in, i.a., overcrowding rate, especially in Estonia (by 28 percentage points, from 41.7% in 2008 to 13.9% in 2019) and in the Czech Republic (by 14.4 percentage points, from 29.8% in 2008 to 14.4% in 2019). In the case of Croatia, the percentage of households in which total housing costs accounted for more than 40% of disposable income decreased (from 14% in 2008 to 4.7% in 2019) (source: Eurostat, Database).

In contrast, significant declines in the ranking of countries regarding the level of housing conditions were observed for Malta (down 12 positions), Denmark (down 11 positions) and Luxembourg (down 10 positions) (Table 3). In the period under review, Malta had a significant, among other things, increase in the proportion of the population describing their dwelling as too dark (from 4.7% in 2008 to 10% in 2019). In Denmark there was a significant increase in the proportion of the population living in dwellings with a leaking roof, damp walls, floors or foundations (from 8.7% in 2008 to nearly 15% in 2019). In Luxembourg there was an increase in the proportion of the population whose total housing costs represented more than 40% of disposable income (housing cost overburden rate, from 3.7% in 2008 to more than 10% in 2019).

Table 2. *Descriptive statistics for selected indicators describing the housing conditions of the population in the European Union countries in 2008 and 2019.*

Specification	Average number of rooms per person	Overcrowding rate (%)	Share of housing costs in disposable household income (%)	Housing cost overburden rate (%)	Share of total population having neither a bath, nor a shower in their dwelling (%)	Share of total population not having indoor flushing toilet for the sole use of their household	Share of total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor (%)	Persons who cannot afford a colour TV (%)	Persons who cannot afford a computer (%)	Persons who cannot afford a washing machine (%)	Share of total population considering their dwelling as too dark (%)	Pollution, grime or other environmental problems (%)	Exposure to air pollution by particulate matter (%)	Serve housing deprivation rate (%)	Inability to keep home adequately warm (%)
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}
2008															
Average	1,6	23,8	20,8	9,6	5,0	5,3	17,7	0,6	9,3	2,4	7,2	16,5	18,1	8,2	11,8
Median	1,6	15,3	18,2	9,1	0,8	0,9	17,0	0,4	6,7	0,9	6,8	16,2	17,5	5,1	6,0
Minimum	1,0	1,7	9,9	1,8	0,0	0,0	4,4	0,0	1,4	0,1	3,9	7,7	5,4	0,6	0,9
Maximum	2,2	57,4	31,8	22,2	41,8	41,3	30,8	3,1	35,9	20,0	11,8	35,8	41,5	29,1	66,3
Distance (Max – Min)	1,2	55,7	21,9	20,4	41,8	41,3	26,4	3,1	34,5	19,9	7,9	28,1	36,1	28,5	65,4
Interquartile ranges	0,8	36,8	8,8	8,8	3,1	2,9	9,9	0,5	8,1	1,8	3,2	7,9	9,5	11,8	11,9
Coefficient of variation (positional) (%)	25,0	120,6	24,2	48,5	203,3	161,1	29,3	56,3	60,1	102,9	23,2	24,2	27,2	116,6	99,2
Coefficient of asymmetry (positional) (%)	-0,25	0,51	0,60	-0,01	0,75	0,64	0,24	0,00	0,45	0,46	-0,03	-0,03	-0,08	0,41	0,64
2019															
Average	1,7	17,6	18,8	8,5	2,5	2,7	13,8	0,4	3,7	1,0	5,4	13,6	12,1	4,3	8,1
Median	1,7	12,8	17,7	6,5	0,5	0,5	13,2	0,3	2,6	0,4	5,1	13,3	11,8	2,8	5,4
Minimum	1,1	2,2	8,2	2,3	0,0	0,0	4,1	0,0	1,3	0,0	2,6	5,9	4,8	0,9	1,8
Maximum	2,3	45,8	38,9	36,2	22,8	24,2	31,1	1,5	12,3	7,4	10,0	33,9	19,6	14,2	30,1
Distance (Max – Min)	1,2	43,6	30,7	33,9	22,8	24,2	27,0	1,5	11,0	7,4	7,4	28,0	14,8	13,3	28,3
Interquartile ranges	0,7	20,9	5,1	4,9	1,7	1,5	5,7	0,2	2,4	0,6	2,6	5,3	4,2	4,0	5,6
Coefficient of variation (positional) (%)	19,1	81,8	14,3	38,0	167,5	145,0	21,8	37,5	45,7	75,0	25,5	19,7	17,8	73,2	51,9
Coefficient of asymmetry (positional) (%)	0,00	0,50	0,19	0,26	0,64	0,69	-0,10	0,11	0,49	0,58	0,07	-0,33	0,24	0,58	0,04
Changes 2019/2008															
Average	0,2	-6,1	-2,0	-1,1	-2,4	-2,6	-3,9	-0,2	-5,7	-1,4	-1,8	-2,9	-6,1	-4,0	-3,8
Median	0,1	-2,5	-0,5	-2,6	-0,3	-0,4	-3,8	-0,1	-4,1	-0,5	-1,8	-2,9	-5,7	-2,3	-0,6
Minimum	0,1	0,5	-1,7	0,5	0,0	0,0	-0,3	0,0	-0,1	-0,1	-1,3	-1,8	-0,6	0,3	0,9
Maximum	0,1	-11,6	7,1	14,0	-19,0	-17,1	0,3	-1,6	-23,6	-12,6	-1,8	-1,9	-21,9	-14,9	-36,2
Distance	0,0	-12,1	8,8	13,5	-19,0	-17,1	0,6	-1,6	-23,5	-12,5	-0,5	-0,1	-21,3	-15,2	-37,1
Interquartile ranges	-0,2	-15,9	-3,8	-3,9	-1,4	-1,5	-4,2	-0,2	-5,7	-1,2	-0,6	-2,6	-5,3	-7,8	-6,3

Source: *Own elaboration based on data from Eurostat (access: 27 January 2021).*

Table 3. *Typological classification of the European Union countries according to the level of housing conditions in 2008 and 2019.*

Specification	2008		2019		Change of position 2019/2008
	The value of the synthetic measure	Position	The value of the synthetic measure	Position	
Finland	0,720	3	0,801	1	2
Ireland	0,788	1	0,775	2	-1
Estonia	0,571	13	0,747	3	10
Czechia	0,546	15	0,731	4	11
Austria	0,658	5	0,721	5	0
Spain	0,657	6	0,713	6	0
Sweden	0,637	9	0,710	7	2
Slovakia	0,602	10	0,706	8	2
Croatia	0,471	20	0,704	9	11
Italy	0,533	16	0,690	10	6
France	0,665	4	0,688	11	-7
Luxembourg	0,724	2	0,675	12	-10
Cyprus	0,641	7	0,670	13	-6
Slovenia	0,463	21	0,665	14	7
Lithuania	0,463	22	0,654	15	7
Poland	0,446	23	0,649	16	7
Netherlands	0,574	12	0,648	17	-5
Belgium	0,557	14	0,642	18	-4
Hungary	0,375	24	0,614	19	5
Malta	0,640	8	0,609	20	-12
Portugal	0,495	18	0,591	21	-3
Denmark	0,590	11	0,587	22	-11
Germany	0,498	17	0,565	23	-6
Romania	0,199	28	0,555	24	4
Latvia	0,348	26	0,545	25	1
United Kingdom	0,489	19	0,529	26	-7
Bulgaria	0,198	27	0,476	27	0
Greece	0,353	25	0,373	28	-3
Minimum	0,198		0,373		
Maximum	0,788		0,801		
Median	0,552		0,660		
Range (Min-Max)	0,572	×	0,427	×	×
Coefficient of variation (positional) (%)	26,04		14,50		

Source: *Own elaboration based on data from Eurostat.*

During the period under review there was a significant increase in the level of housing conditions of the EU population. In 2019, compared to 2018, the percentage of countries with good housing conditions significantly increased (by 32.1 percentage

points), while there was a decrease in the percentage of countries with low (by 7.1 percentage points) and very poor housing conditions (by 7.1 percentage points) . In 2008, nearly one in five countries in the European Community had poor or very poor housing conditions. In 2019, most countries were classified as typological classes with good or very good housing conditions (approximately 70% of countries) (Table. 4).

Finland had very good housing conditions in 2019 and was classified as typological class I. In particular, Finland has very favorable housing conditions in terms of the relatively low burden of household disposable income on housing expenditure, the provision of virtually all dwellings with basic technical and sanitary facilities, including a bathroom and a flush toilet. In addition, Finland has a very low proportion of residents describing their dwelling as too dark and reporting pollution and environmental problems where they live (Table 5).

Table 4. *Typological classification of the EU countries according to the level of housing conditions in 2008 and 2019.*

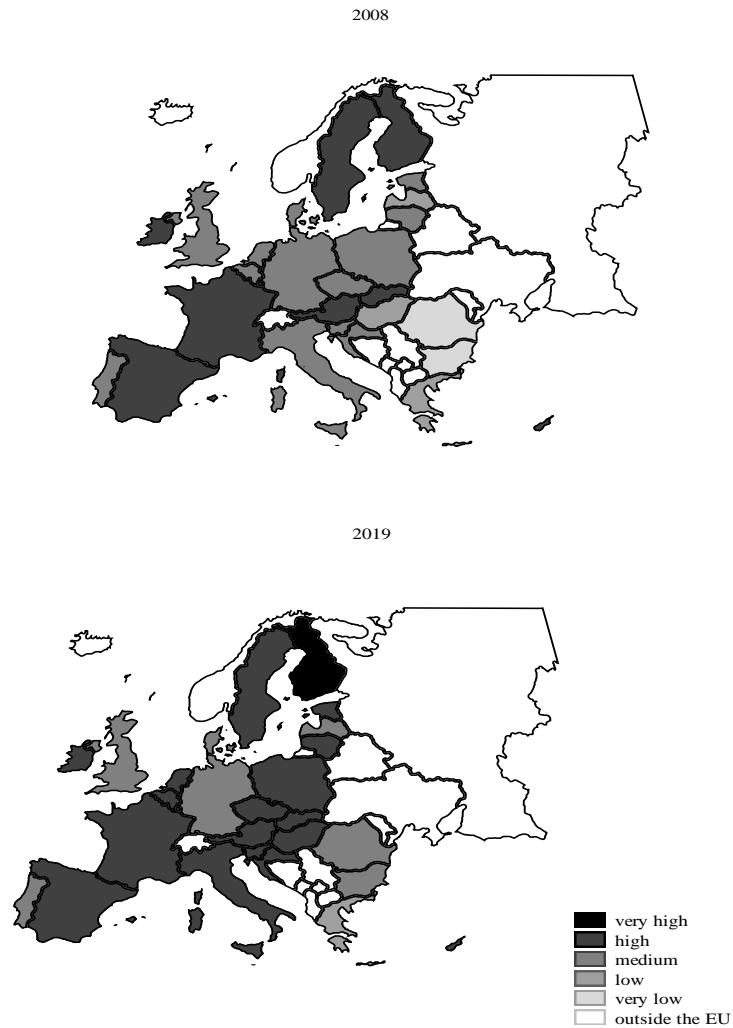| Typological class / Level of housing conditions	The breakpoints of the synthetic measure	Number of countries		Percentage of countries (%)		
		2008	2019	2008	2019	Change 2019/2008 (percentage points)
I (*very high*)	<0,80; 1,00>	0	1	0,0	3,6	3,6
II (*high*)	<0,60; 0,80)	10	19	35,7	67,9	32,1
III (*average*)	<0,40; 0,60)	13	7	46,4	25,0	-21,4
IV (*low*)	<0,20; 0,40)	3	1	10,7	3,6	-7,1
V (*very low*)	<0,00; 0,20)	2	0	7,1	0,0	-7,1

Source: *Own elaboration based on data obtained from Eurostat (accessed on 27 January 2021).*

In contrast, as many as 19 European countries, including Ireland, Estonia, the Czech Republic, Austria, Spain and Sweden, had good housing conditions and were classified as typological class II. The favorable housing conditions in the countries making up classes I and II were due to the relatively low burden of housing expenditure on income, as well as the low proportion of the population living in households where total housing costs are more than 40% of disposable income. Hence, favorable housing conditions were reported in countries with high average GDP levels, low proportion of the population living in poverty and at risk of material deprivation (Table 5).

In 2019, the lowest level of housing conditions was observed in Greece, which was classified as typological class IV. In particular, Greece had the highest level of housing expenditure burden on household budgets (approximately 40%), as well as a high percentage of those households where housing expenditure was more than 40% of disposable income (more than 36%). Moreover, more than one fifth of the general public reports pollution and environmental problems where they live. This class had by far the lowest level of socio-economic development (quantified by GDP in PPS in

% of the EU average) and a high level of economic poverty of the population. Furthermore, more than 70% of the Greek population in the year under review struggled to maintain a positive household budget balance, and the unemployment rate was very high (more than 17%) (Table 5).

Figure 1. *Spatial delimitation of the level of housing conditions in the EU countries in 2008 and 2019.*

2008

2019

Source: Own elaboration based on data obtained from Tables 2 and 3 (accessed on 27 January 2021).

Table 5. *Interclass variation in housing levels across the EU countries in 2019.*

Specification	Year	Typological class / *Level of housing conditions*					Total	Year	Typological class / *Level of housing conditions*					Total
		I	II	III	IV	V			I	II	III	IV	V	
Active features [a)]														
Average number of rooms per person	2008	×	2,0	1,4	1,1	1	1,6	2019	2,1	1,7	1,7	1,3	×	1,7
Share of housing costs in disposable household income		×	16,9	23,1	24,8	26,0	18,2		17,8	17,1	24,8	38,9	×	17,7
Housing cost overburden rate		×	4,5	12,5	11,6	16,2	9,05		4,0	5,7	13,9	36,2	×	6,5
Share of total population not having indoor flushing toilet for the sole use of their household		×	0,6	0,8	6,7	35,2	0,9		0,3	0,5	0,7	0,3	×	0,5
Share of total population living in a dwelling with a leaking roof, damp walls, floors or foundation, or rot in window frames of floor		×	12,4	18	25,7	27,2	167,0		4,1	13,8	14,9	12,5	×	13,2
Persons who cannot afford a computer		×	5,6	6,9	14	33,4	6,7		1,6	2,6	4,9	2,5	×	2,6
Share of total population considering their dwelling as too dark		×	5,5	7,9	10,1	8,2	6,8		3,7	5,1	5	5,3	×	5,0
Pollution, grime or other environmental problems		×	13,7	16,1	20,3	18,6	16,2		9,4	12,4	13,5	20,2	×	13,3
Passive features														
GDP per capita in PPS (%)	2008	×	115,5	91,0	64,0	47,5	98,5	2019	111,0	93,0	79,0	67,0	×	92,0
People at risk of poverty or social exclusion (%)		×	20,4	21,8	28,2	44,5	22,5		15,6	19,5	23,1	30,0	×	20,4
Total unemployment rate (%)		×	6,3	5,8	7,8	5,7	6,3		6,7	5,4	4,2	17,3	×	5,2
In-work at-risk-of-poverty rate (%)		×	5,7	5,9	9,3	10,3	6,1		1,9	6,0	7,3	9,1	×	6,2
Serve material depirvation rate (%)		×	13,1	16,2	35,7	52,5	15,0		7,0	9,4	15,1	30,4	×	11,3
Households making ends meet with great difficulty and difficulty(%)		×	19,8	25,9	44,1	55,7	27,2		6,4	17,4	25,0	71,0	×	18,1
Income quintile share ratio (S80/S20)		×	4,2	5,0	5,9	6,7	4,4		3,7	4,3	5,6	5,1	×	4,5

Note: *a) Taking part in the construction of the synthetic measure value.*
Source: *Own elaboration based on data from Eurostat (access: 27 January 2021).*

5. Summary and Concluding Comments

Housing needs are classified as basic needs; however, they can satisfy higher-order needs. They are an essential element of the material sphere of human life and they are one of the most important aspects of the existence and functioning of households. They play a significant role in both social and economic life. Housing conditions are thus an essential element in measuring the process of economic development and they relate to phenomena in local and global terms. Housing formation processes vary, influenced by, among other things, income, demographic disparities, cultural, economic and environmental differences.

In the EU countries, housing issues are prioritised and constantly monitored, which provides a basis for setting directions in the development policy of the European Community. The housing issues became the basis of the presented study, in which the main objective was to assess the level and identify the differences in terms of the housing conditions of the EU population in 2008 and 2019. The conducted research allowed to draw several conclusions that correspond to the statement that in the period under review there was a significant increase in the level of housing conditions of the EU population. Furthermore, it can be concluded that:

— The changes in housing conditions are a multidimensional phenomenon, described by several indicators and criteria that include, i.a., the number of rooms per capita, overcrowding rate, housing deprivation rate, equipment degree in a dwelling with installations and durable goods, including access to a computer. An environment that provides access to services which meet diverse socioeconomic needs and safety is of great importance.

— The presented analysis of indicators describing housing conditions in EU countries indicates positive changes in the standard of living in the studied countries. This is proved by the conducted empirical research using the synthetic measure. During the period under review there was, among other things, an improvement in the housing deprivation rate that clearly increased in the poorest countries of Central and Eastern Europe (Bulgaria and Romania).

— The presented study reveals that during the period under review there was a significant improvement and reduction in disproportions concerning the level of housing conditions of the EU population. In 2019, compared to 2008, the percentage of EU countries with good housing conditions significantly increased, while the percentage of EU countries with poor and very poor housing conditions decreased. The highest level of housing conditions was observed in Finland, while the lowest in Greece. The level of housing conditions is significantly higher in the Central Western European and Scandinavian countries.

— EU countries are highly varied in this respect, with the main problems of unsatisfactory housing conditions affecting the countries of South-Eastern Europe, due to their low GDP per capita. However, there are exceptions. For

example, the rate of the EU population exposed to pollution, dirt and other environmental problems is significantly higher compared to the EU average, both in Germany – a country with a high GDP per capita – and in Malta, Greece, Latvia, Lithuania and Slovenia, where this GDP is significantly lower.

— In 2019, compared to 2008, the greatest improvements in the level of housing conditions were observed for Croatia, the Czech Republic and Estonia. In contrast, Malta, Denmark and Luxembourg reported significant declines in their national rankings for the level of housing conditions. While in the case of Malta these changes are a consequence of a change in the subjective assessment of the perception of housing conditions, in Denmark the objective indicators of the analysed phenomenon have worsened and in Luxembourg the problem concerns an increased housing expenditure compared to the disposable income received.

— Hence, the conducted research showed not only an increase in the general level of housing conditions, as evidenced by the increase in the average level of the synthetic measure, but also a reduction in disparities between EU countries in terms of the level of housing conditions.

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Notes:

[1]*According to the European standard, an apartment or house should consist of one common room (which may be a living room, lounge or dining room) plus: one room (bedroom) for a couple that manages the household, one room (bedroom) for each of the other single adults, one room (bedroom) for two children of the same gender who are at the age of 12 to 17, one room (bedroom) for a person at the ages of 12 to 17, if not included in the above, one room for two children under the age of 12.*