CONSUMERS' PERCEPTIONS OF HEALTH AND FACTORS INFLUENCING FULFILMENT OF THE NEED FOR HEALTHCARE IN EU COUNTRIES

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Abstract: *The paper deals with subjective perceptions of health by individuals. The research aimed at understanding socioeconomic and demographic factors influencing the fulfilment of healthcare needs and at finding out categories of factors that lead to the highest chances of meeting the need in consumer segments formed according to perceptions of their health status. The analyses were based on the EU-SILC database of primary data on the income situation and living conditions of households. In 2017, the database included extra questions on health. The method of cluster analysis was employed. As a result, three clusters of individuals representing EU countries formed depending on the perceived state of health – the authors named the clusters 'optimistic', 'neutral', and 'pessimistic'. For each segment, the binary logistic regression was applied to determine categories of factors leading to the highest probability of meeting the healthcare need. The greatest influence over the fulfilment of the need for healthcare has been confirmed for the factor "Sector of economic activity", followed by the type of economic activity. Some differences were revealed between segments. For example in the third segment, i.e., respondents who rated worst their health, a strong influence of education has been identified. The highest chances of meeting the need for health care are achieved in the first segment by executives, but in the second and the third segment by individuals active in education. On the other hand, craftsmen and workers have the lowest chances. In all segments, the influence of household composition was confirmed, with single households and single-parent households reporting lower chances of meeting their healthcare needs. Respondents who did not feel their healthcare need was met mostly said it was due to financial reasons, long waiting times, or fear of medical treatment.*

Keywords: *Health, need for healthcare, consumer behaviour, income, household.*

JEL Classification: *I31, P46.*

Introduction

The health is defined as a state of a person's physical, mental, and social well-being. Responsibility for health is determined not only by the healthcare system and genetic predispositions of individuals but also by one's lifestyle and approach to achieving and keeping a good state of health (World Health

Organization, 2006). Consumer behaviour concerning healthcare differs from other areas, above all because it is "a question of life and death". Therefore, this type of decision-making tends to get significantly affected by emotions (Cazacu, 2015). Another significant difference is that consumers get healthcare products and services through a third party, most often a physician, who recommends steps to be taken and makes the decisions (Radulescu et al., 2012). Kenkel (1990) states that physicians can create or reduce demand for their services. Meeting health care needs is not always a matter of consumer choice, but other factors also play a role.

The main goal of the paper is to reveal socioeconomic and demographic factors influencing the fulfilment of EU consumers' healthcare needs and to find out categories of factors that lead to the highest probability of meeting the need in consumer segments formed according to perceptions of their health status. How an individual's health is perceived and, most importantly, whether healthcare needs are met when they occur have been the basic research questions of the paper. To learn about subjective views on health, the authors used the EU-SILC survey. The survey provides data on subjective perceptions of health as such, as well as information about meeting the need for healthcare and possible reasons for not meeting this need. The results of the analyses may represent a strong argument for implementing improvements in the healthcare systems. This means in particular improving access to healthcare services for the majority of consumers.

1. Theoretical Background

People strive to meet their healthcare needs under the conditions set by the healthcare system and the financial resources they have available. The attitude of a household to their health and the use of healthcare services affects the household's living standard (Callander et al., 2019). Khan and Ul Husnain (2019) demonstrated that healthcare expenditure and income are co-integrated and, therefore, there is a link between the standard of living, income situation, and health standard. Lenhart (2019) examined the effect of income on the state of health and found that higher income increased the chances of excellent or very good health being reported by households' heads. The

increase observed here ranged from 6.9 to 8.9 percentage points. According to Knaul et al. (2012), low-income households living near the risk-of-poverty threshold spent more on healthcare. It means their healthcare expenses accounted for a higher part of their disposable income. However, in absolute numbers, they could afford fewer healthcare services than households in higher-income categories. According to Blumberg et al. (2014), health-related expenditures are rising faster than incomes, both at the national and household levels. Shares of households' disposable incomes spent on healthcare are increasing. In countries where parts of the population have no health insurance, the financial demands of healthcare could lead to personal bankruptcies.

The subjective health in Central and Eastern European countries is influenced by a complex mix of determinants (Borisova, 2019). Differences in individuals' socioeconomic statuses (stemming from different economic activities, education, or income categories) can contribute to health inequalities and to chances to meet the healthcare needs. Individuals with higher economic statuses are more influenced by behavioural and psychological factors in their approach to health than those with lower socioeconomic statuses (Atkinson & Marlier, 2010; Peretti-Watel et al., 2016). Socioeconomic status affects health-related quality of life (Puciato et al., 2020). Self-perceived health is influenced by income and labour status and by demographic factors such as gender or age in EU countries (Jindrová & Labudová, 2020).

Chaupain-Guillot and Guillot (2015) state that demographic factors are other factors that influence consumers' access to healthcare. Gender is one of the factors affecting approach to health-related questions (Socías et al., 2016; Roy & Chaudhuri, 2008). The results of the study by Roy and Chaudhuri (2008) showed that women tended to rate their health worse and used fewer health services – reportedly because of the lower socioeconomic status of women. Sonik et al. (2020) added that discrimination against women in access to healthcare was not necessarily the reason. Women and men simply often had different preferences as far as medical treatment is concerned. Next to gender, age is another significant factor, with preventive and aesthetic motives for medical treatment prevailing at younger ages. Another significant factor co-determining the

average number of doctor's visits is education (Hoeck et al., 2011). Puciato et al. (2020) see education as important factor affecting an individual's level of perceived health. According to Czibere et al. (2019) the level of the highest attained education influence the health status indirectly. They proved that the education have significant impact only on the age when an illness begun. Puciato et al. (2020) talks about a marital status as a determinant of health conditions. The marital status is closely related to the household composition. Radulescu et al. (2012) explain that family members and also friends can influence an approach of the individual to the health. Gender, age and other demographic and socioeconomic factors also affect an approach of individuals to health risky behaviour (Morkevičius et al., 2020; Kim et al., 2018). Kunzová and Hrubá (2013) point out that health is correlated with many factors and also with lifestyle. Failure to maintain a healthy lifestyle put consumers furtively at risk of ill health (Mlčochová & Papežová, 2012).

The need for healthcare or medical treatment may not be met due to a variety of reasons. Kenkel (1990) explained the relationship between healthcare and individuals' level of knowledge and available information. According to this author, poorly informed consumers tended to underestimate the importance of healthcare. Schmid (2015), on the other hand, found that information had a negative effect on the use of healthcare services. This was supposedly related to fears of being examined and diagnosed due to which people did not seek necessary medical care. According to Fiorillo (2020) and Popovic et al. (2017), the most common reasons for not seeking medical care were financial and time constraints and the distance to health facilities (in connection with the 'wait-and-see' approach used by the staff of medical facilities).

It must be taken into account that meeting health-related needs has a strongly individual dimension and is not a matter of course for all individuals. Satisfaction rates are not the same for everyone under identical conditions (Banthin et al., 2008).

There are plenty of objective indicators that tell us about the availability and quality of healthcare in individual countries. These objective data speak of the healthcare system as a whole in terms of its quality, new methods, and achieved results. However, the objective data do not address how healthcare services provided are perceived by individuals, whether healthcare is available at the time and quality needed, nor what are the reasons for any failure to meet the need for healthcare. The information on how individuals subjectively perceive health and healthcare services are of utmost importance for any responsible national healthcare system – hence the value of subjective variables in analyses in this area (Schokkaert et al., 2017). As explained by Borisova (2019), both subjective and objective indicators of health should be used wherever possible because they often interact with each other. Health policies should adopt a multidimensional approach and develop incentives to remove barriers that limit consumer access to health services (Popovic et al., 2017).

2. Research Methodology

To learn about the behaviour of individuals in relation to their state of health, the authors used data obtained within the EU-SILC survey (European Union – Statistics on Income and Living Conditions), specifically, the EU-SILC 2017. In addition, the extensive EU-SILC microdata set provided detailed information on the income situations of households and individuals. The data also allowed for the identification of households and individuals in terms of various demographic and socioeconomic factors, as well as a description of households' and individuals' living conditions in different areas of life. The EU-SILC survey is mandatory in all EU countries and follows a uniform methodology published by Eurostat (Eurostat, 2019). Eurostat also publishes a uniform methodology for further processing of the results. In 2017, EU-SILC was conducted in a total of 256,468 European households and had a total of 515,880 individual respondents (this is the number of cases analysed in this paper).

The EU-SILC microdata database originally included 7 indicators describing subjective perceptions of respondents concerning the need and the availability of healthcare services. The database has been extended in 2017 by an ad-hoc module of another 7 indicators describing the financial demandingness of healthcare, as perceived subjectively by households. This means, for example, the cost of medicines and dental care, or the number of

visits to medical specialists. The EU-SILC data contain a conversion factor which is used as a weight in the conversion of the sample data to the base population (i.e., the whole population of the country and the whole EU). A five-point scale (1 – very good state of health; 2 – good; 3 – fair; 4 – poor; 5 – very poor) was used for subjective state of health assessments.

The authors used cluster analysis to identify segments of EU citizens that showed similarities in subjective perceptions of the state of health. Subjective assessment of health evaluated by consumers is the variable applied in the cluster analysis. The clusters are formed according to the proportion of individuals among respondents in each country who rate their health as very good, good, fair, poor and very poor. The goal of cluster analysis is to classify objects into a certain number of clusters. Objects within a cluster are similar to the greatest extent possible and objects within a cluster are the least possibly similar to objects from other clusters. Individual objects are gradually grouped into smaller clusters and these clusters are then merged to form larger clusters (Meloun & Militký, 2012). The authors used the K-means algorithm which identifies homogeneous groups of research objects based on selected characteristics. For each of the initial clusters, the authors determined the centroid value (centroid is a vector of the average values of each variable). Objects were assigned to clusters based on the centroid to which the object was closest. The optimal number of clusters is verified by applying ANOVA analysis showing significant difference between clusters.

According to Hebák et al. (2015), K-means algorithm is an iterative procedure that minimizes the function of the following formula (1):

$$f_{KP} = \sum_{h=1}^{k}\sum_{i=1}^{n} u_{ih} \|x_i - \bar{x}_h\|^2 , \qquad (1)$$

where the $u_{ih} \in \{0,1\}$ elements indicate whether the i-th object belongs (value 1) or does not belong (value 0) to the h-th cluster and is a vector of average values of the h-th cluster. The conditions of the following formula (2) must be met:

$$\sum_{h=1}^{k} u_{ih} = 1 \quad \text{for} \quad i = 1, 2, \dots, n$$
$$\text{and} \quad \sum_{i=1}^{n} u_{ih} > 0 \quad \text{for} \quad h = 1, 2, \dots, k. \qquad (2)$$

The chances of meeting the need for healthcare with respect to different categories of demographic and socioeconomic factors have been assessed by logistic regression analysis. The explained variable could take two values: unmet need for healthcare (0) and met need for healthcare (1). The following factors were used as explanatory variables: gender, education, economic status, sector of economic activity, and household income group. The binary logistic regression model can be expressed by the formula (3) showing the relationship between the probability of a phenomenon $P^{(x)}$ (Y = 1), i.e., meeting the need for healthcare, under conditions given by the values of the independent variables (x):

$$ln\left(\frac{P^{(x)}}{1-P^{(x)}}\right) = \beta_0 + \sum \beta_i x_i . \qquad (3)$$

The $ln\ (P/(1 – P))$ formula (called the logit of P), can be expressed as a weighted sum of the values of the independent variables. The logit of P is the logarithm of the probability of occurrence of the phenomenon under study. The model can be also expressed by the following formula (4):

$$P\left(Y = \frac{1}{x}\right) = P^{(x)} = \frac{exp(\beta_0 + \sum \beta_i x_i)}{1 + exp(\beta_0 + \sum \beta_i x_i)}, \qquad (4)$$

where the parameter estimates β_i are obtained from the measurement matrix of x. If β_i is equal to zero, then the parameter has no effect on the observed phenomenon (Hendl, 2006). The quality of the binary regression model is assessed by the Nagelkerke R-squared indicator, the significance of the model is verified by the Hosmer and Lemeshow test. The VIF indicator is used to verify a presence of multicollinearity in models. The VIF values higher than 10 indicates multicollinearity in the model (Hebák et al., 2015).

The EU-SILC data have been processed by the IBM SPSS Statistics software. The algorithm of cluster analysis and the binary logistic regression have also been implemented in the SPSS software.

3. Research Results

The authors took the opportunity to analyse data from the EU-SILC survey conducted in 2017. In that year, the survey was extended by an ad hoc module aimed at healthcare. The respondents commented on how they subjectively perceived

their states of health and whether their healthcare needs were met. If a respondent said their need for healthcare was not met, they were asked to give the reasons. The results of the survey provide important information on health-related behaviour of people and, given the representativeness of the population, are very useful for the implementation of corrective measures in the health sector. Given the size of the survey sample (covering 27 countries, i.e., about 515 thousand EU respondents and dozens of content questions), this paper could not cover all the values included in the survey, instead, the authors focused on typical and extreme values only.

3.1 Individual Perceptions of the State of Health

The results of the subjective assessments of the state of health showed that there were countries where almost 50% of respondents rated their states of health as 'very good' (for example Cyprus and Greece). In most countries, a major part of respondents evaluated their states of health by the grade of '2', i.e., 'good' (reported by about 50% of respondents), or grade '3' – 'fair'

(20–30% of respondents). However, there were countries where some respondents (up to 10% or in the order of tens of %) rated their states of health as 'very poor' or 'poor'. The highest frequencies of negative health evaluations were found in the following countries (Tab. 1).

In countries with negative health ratings (see Tab. 1), respondents also more frequently reported issues related to long-term illnesses that limited their everyday activities. In other EU countries (those not listed in Tab. 1), 2% or fewer respondents assessed their states of health as very poor.

To provide an overall overview and summarize the subjective perception of the state of health in all EU countries, the authors employed cluster analysis and the K-means algorithm. As a result, three clusters of individuals were identified based on the perceived statuses of health. The proportions of individuals evaluating their health status as very good, good, fair, poor and very poor enabled the formation of three segments and sorted countries into segments according assessments by residents' representatives (Tab. 2).

Tab. 1:	**EU countries with the highest proportions of individuals perceiving negatively their states of health**						
	Croatia	**Portugal**	**Hungary**	**Latvia**	**Lithuania**	**Poland**	**Bulgaria**
Very poor state of health	3.9%	3.6%	3.2%	3.1%	3.1%	2.7%	2.5%
Poor state of health	14.0%	11.0%	9.0%	13.8%	13.0%	10.0%	8.0%

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

Tab. 2:	**Subjective assessments of health (SH) in EU countries**		
	Cluster 1 'optimistic'	**Cluster 2 'neutral'**	**Cluster 3 'pessimistic'**
EU countries in the cluster	Austria, Cyprus, Greece, Croatia, Ireland	Belgium, Bulgaria, Germany, Denmark, Spain, Finland, France, Italy, Luxembourg, Malta, Netherlands, Romania, Sweden, Slovakia	Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Portugal, Slovenia
Very good SH	**40%**	23%	13%
Good SH	33%	**48%**	**41%**
Fair SH	18%	21%	**32%**
Poor SH	7%	6%	11%
Very poor SH	2%	2%	3%

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

Tab. 3: ANOVA in the cluster analysis

	Cluster		Error		F	Sig.
	Mean square	df	Mean square	df		
Very good SH	1,124.076	2	36.397	24	30.884	0.000
Good SH	428.770	2	22.651	24	18.930	0.000
Fair SH	415.434	2	15.236	24	27.267	0.000
Poor SH	66.515	2	5.447	24	12.211	0.000
Very poor SH	3.953	2	0.626	24	6.315	0.006

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

Subsequently, ANOVA analysis confirmed the correct number of clusters identified (Tab. 3). Significance values are below the significance level α = 0.05. Clusters are significantly different. Also, there was a zero change according to the iteration history after three iterations during K-means algorithm process. If more cluster were formed, the difference between clusters was not confirmed (significance values were above the significance level).

The K-means algorithm assigned individuals from five countries to the first cluster, of which almost three quarters rated their health as good and 40% as very good. Due to the positive health assessments, the cluster has been named as 'optimistic'. In the second group, about half of the respondents rated their health as good. The second segment included the largest number of EU countries compared to the other segments. The third group has been more pessimistic about their health, with a higher number of respondents rating their health as fair. On average, 14% of respondents in this group evaluated their health as poor. Respondents from countries with more negative ratings were more likely to report problems related to long-term illness or health limitations.

The average share of a country's population reporting limitations in everyday activities due to poor health have amounted to units of per cent. Yet, there were countries where people did not perceive such limitations at all (Spain, Ireland, Malta, and Sweden). However, when drawing these conclusions, we need to take into account whether the conditions created by the state are so satisfactory that people can lead active lives without limitations, or whether the reported opinions were shaped by low awareness of the possibilities of improving living conditions.

3.2 Perceived Fulfilment of Healthcare Needs

When asked whether the medical assistance requested was actually received, there were countries where almost 100% of respondents answered positively. These were, for example, Spain, Austria, Malta, and Luxembourg. In some countries, on the other hand, significant amounts of respondents answered negatively, i.e., that they did not receive the treatment they needed. In Greece, for example, 25% of respondents gave negative answers, in Estonia, it was 13% of respondents, in Poland 12%, and in Latvia 10%. In other EU countries, unmet healthcare needs were reported by up to 10% of respondents.

The authors used binary logistic regression to find out which factors influenced the fulfilment of the need for healthcare and which categories of demographic and socioeconomic factors increased the chances of the fulfilment of the need.

The explained variable in the model has been the fulfilment of the need for healthcare. The variable could take two values: 0 indicating no satisfaction of the need (failure to meet the need for healthcare); and 1 indicating satisfaction of the need. The explanatory variables entering the regression model were Gender, Education, Household composition, Economic activity, Income quintile based on the household's disposable income, and Sector of economic activity based on ISCO (International Standard Classification of Occupations).

The authors have calculated the binary logistic regression for all three segments (created based on the subjective assessments of health by the respondents – see Tab. 2). This allowed for explanations of the results of binary logistic regressions in relation to optimistic and

Tab. 4: **Collinearity statistics**

	Segment 1 VIF	Segment 2 VIF	Segment 3 VIF
Gender	9.446	8.677	9.347
Household composition	4.994	4.733	5.349
Education	9.654	9.847	9.822
Economic activity	3.549	3.585	3.705
Quintiles	5.791	6.041	6.184
Sector	4.496	5.096	5.435

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

pessimistic assessments of health by individual respondents.

Before interpreting the model, the presence of multicollinearity in three models for all segments was verified. The linear regression procedure with same predictors was used for this purpose and collinearity diagnostics were requested. All values of VIF indicators are below the value 10 (Tab. 4). Multicollinearity is not present in the models, as indicated by the low values of the Condition indexes implemented in the IBM SPSS Statistics.

In all three logistic regressions, Hosmer and Lemeshow tests were used to prove the significance of the models (the resulting p-values had to be lower than 0.05). The Nagelkerke R-squared indicators proved the quality of the models as 83% of the variability in the dependent variable was explained for the first segment (Tab. 5), for the second model (Tab. 6) it was 89%, and for the third model (Tab. 7) it was 73% of the variability of the dependent variable. Categories with the highest chances of meeting the health for healthcare have been highlighted in bold in the tables.

The results of the binary logistic regression for the first segment (Tab. 5) showed that all the explained variables influenced the fulfilment of the need for healthcare. The strongest influence has been identified in the 'Sector' variable,

Tab. 5: **Chances of meeting the need for healthcare for segment 1 – 'optimistic' – Part 1**

	Estimate B	Standard deviation	Wald	df	Sig.	Exp(B)
Gender (males)	0.074	0.003	863.334	1	0.000	**1.077**
Household composition (other)[a]			30,666.113	4	0.000	
Household composition (single)	0.024	0.003	48.946	1	0.000	1.024
Household composition (two adults)	0.433	0.003	20,608.297	1	0.000	**1.542**
Household composition (single parent)	0.228	0.009	692.013	1	0.000	1.256
Household composition (two adults and children)	0.378	0.004	10,978.219	1	0.000	1.460
Education (university)[a]			138,956.161	2	0.000	
Education (basic)	−0.382	0.004	11,072.918	1	0.000	0.682
Education (secondary/high school)	0.681	0.003	52,078.088	1	0.000	**1.976**

Tab. 5: Chances of meeting the need for healthcare for segment 1 – 'optimistic' – Part 2

	Estimate B	Standard deviation	Wald	df	Sig.	Exp(B)
Economic activity (other)[a]			152,401.000	4	0.000	
Economic activity (employed)	1.225	0.004	115,136.806	1	0.000	**3.403**
Economic activity (self-employed)	0.510	0.005	11,126.210	1	0.000	1.666
Economic activity (unemployed)	−0.035	0.004	66.343	1	0.000	0.965
Economic activity (old-age pensioner)	0.669	0.003	36,924.689	1	0.000	1.952
Quintiles (fifth)[a]			27,200.371	4	0.000	
Quintiles (first)	0.467	0.004	16,704.470	1	0.000	**1.595**
Quintiles (second)	0.460	0.004	17,002.700	1	0.000	**1.584**
Quintiles (third)	0.411	0.004	13,717.567	1	0.000	1.508
Quintiles (fourth)	0.436	0.004	14,494.801	1	0.000	1.546
Sector (craftsmen and workers)[a]			358,990.333	10	0.000	
Sector (legislators and executives)	2.430	0.006	158,988.056	1	0.000	**11.354**
Sector (science and technology)	1.892	0.007	68,520.486	1	0.000	6.630
Sector (healthcare)	1.816	0.008	46,283.147	1	0.000	6.147
Sector (education and training)	2.118	0.008	67,896.034	1	0.000	8.311
Sector (public administration)	2.051	0.007	83,857.200	1	0.000	7.777
Sector (information technology)	1.840	0.012	23,631.131	1	0.000	6.293
Sector (law, culture, sport)	1.445	0.008	33,479.194	1	0.000	4.243
Sector (officials)	1.385	0.005	79,697.080	1	0.000	3.995
Sector (services and sales)	0.986	0.003	95,813.287	1	0.000	2.681
Sector (agriculture, forestry, fishing)	0.488	0.003	20,737.801	1	0.000	1.630

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

Note: [a] This parameter has been set to zero because it is redundant.

where legislators and executives were 11 times more likely to have their healthcare needs met than craftsmen and workers. The second most important variable in terms of influence significance was Economic activity, where employees were found to have the highest chances of the fulfilment of their need for healthcare.

Similarly, the results of the logistic regression of the second segment data (Tab. 6) proved the significance of most of the factor categories except for the category of agriculture in the Sector variable and the category of single parents in the Household composition variable. The most significant factor in terms

of increasing the likelihood of fulfilling the need for healthcare has been the Sector variable again, where the employees in the healthcare sector, the education and training sector had the highest chances of having their healthcare needs met. The chances of both categories were almost 7 times higher compared to craftsmen and workers. The results have also shown that people with primary education had the highest chances of the fulfilment of their healthcare needs (even three times higher compared to university graduates). This finding may be related to the fact that primary education (as the highest level of education attained) was reported largely by elderly respondents who were no longer economically active and had sufficient time for healthcare. Actually, time constraints were one of the main reasons for not fulfilling the need for healthcare. It is worth noting that the lowest chances were identified in the groups of single mothers and single households (the Household composition variable), in the first segment (Tab. 5).

Tab. 6: Chances of meeting the need for healthcare for segment 2 – 'neutral' – Part 1

	Estimate B	Standard deviation	Wald	df	Sig.	Exp(B)
Gender (males)	0.452	0.001	215,965.723	1	0.000	**1.571**
Household composition (other)ᵃ			462,436.433	4	0.000	
Household composition (single)	0.132	0.001	11,210.770	1	0.000	1.141
Household composition (two adults)	0.620	0.001	262,190.359	1	0.000	1.859
Household composition (single parent)	0.003	0.003	1.207	1	0.272	1.003
Household composition (two adults and children)	0.690	0.001	255,848.438	1	0.000	**1.994**
Education (university)ᵃ			868,163.355	2	0.000	
Education (basic)	1.194	0.002	542,042.619	1	0.000	**3.299**
Education (secondary/high school)	0.929	0.001	755,609.824	1	0.000	2.531
Economic activity (other)ᵃ			1,174,238.320	4	0.000	
Economic activity (employed)	1.204	0.001	1,026,477.356	1	0.000	**3.333**
Economic activity (self-employed)	1.075	0.002	287,131.505	1	0.000	2.931
Economic activity (unemployed)	0.546	0.002	102,352.112	1	0.000	1.726
Economic activity (old-age pensioner)	1.009	0.001	588,650.365	1	0.000	2.744
Quintiles (fifth)ᵃ			320,935.300	4	0.000	
Quintiles (first)	0.056	0.001	1,740.229	1	0.000	1.057
Quintiles (second)	0.361	0.001	69,696.199	1	0.000	1.434
Quintiles (third)	0.615	0.001	186,094.038	1	0.000	**1.850**
Quintiles (fourth)	0.554	0.001	150,418.704	1	0.000	1.741

Tab. 6: Chances of meeting the need for healthcare for segment 2 – 'neutral' – Part 2

	Estimate B	Standard deviation	Wald	df	Sig.	Exp(B)
Sector (craftsmen and workers)[a]			2,215,024.995	10	0.000	
Sector (legislators and executives)	1.816	0.003	312,071.282	1	0.000	6.150
Sector (science and technology)	1.706	0.002	557,060.069	1	0.000	5.508
Sector (healthcare)	1.920	0.002	651,676.182	1	0.000	**6.818**
Sector (education and training)	1.923	0.003	422,840.017	1	0.000	**6.840**
Sector (public administration)	1.444	0.002	376,423.267	1	0.000	4.239
Sector (information technology)	1.236	0.005	74,735.164	1	0.000	3.441
Sector (law, culture, sport)	1.330	0.003	228,003.546	1	0.000	3.781
Sector (officials)	1.467	0.002	604,825.766	1	0.000	4.334
Sector (services and sales)	0.873	0.001	548,482.580	1	0.000	2.395
Sector (agriculture, forestry, fishing)	−0.001	0.002	0.675	1	0.411	0.999

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

Note: [a] This parameter has been set to zero because it is redundant.

The sector has proven to be the factor most influencing the fulfilment (and bringing the highest chances for fulfilment) of the need for healthcare in the third segment as well. Especially, it was the category of Education and training (Tab. 7). The Sector variable was followed by Education and Economic Activity variables. Here, the finding that old-age pensioners had the highest chances of having their need for healthcare met was confirmed again. This finding confirmed the consideration that old-age pensioners are not limited by time constraints.

Tab. 7: Chances of meeting the need for healthcare for segment 3 – 'pessimistic' – Part 1

	Estimate B	Standard deviation	Wald	df	Sig.	Exp(B)
Gender (males)	0.166	0.001	16,853.353	1	0.000	**1.181**
Household composition (other)[a]			58,098.941	4	0.000	
Household composition (single)	−0.132	0.002	5,396.762	1	0.000	0.877
Household composition (two adults)	0.227	0.002	21,536.195	1	0.000	1.255
Household composition (single parent)	0.082	0.004	354.012	1	0.000	1.086

Tab. 7: Chances of meeting the need for healthcare for segment 3 – 'pessimistic' – Part 2

	Estimate B	Standard deviation	Wald	df	Sig.	Exp(B)
Household composition (two adults and children)	0.229	0.002	19,878.144	1	0.000	**1.257**
Education (university)[a]			351,848.974	2	0.000	
Education (basic)	1.084	0.002	245,715.155	1	0.000	**2.956**
Education (secondary/high school)	0.840	0.002	300,404.826	1	0.000	2.317
Economic activity (other)[a]			300,178.271	4	0.000	
Economic activity (employed)	0.703	0.002	201,977.168	1	0.000	2.021
Economic activity (self-employed)	0.504	0.002	43,872.959	1	0.000	1.655
Economic activity (unemployed)	0.413	0.003	23,643.357	1	0.000	1.511
Economic activity (old-age pensioner)	0.930	0.002	250,712.178	1	0.000	**2.535**
Quintiles (fifth)[a]			84,835.551	4	0.000	
Quintiles (first)	0.255	0.002	18,188.098	1	0.000	1.290
Quintiles (second)	0.318	0.002	30,592.928	1	0.000	1.375
Quintiles (third)	0.370	0.002	43,078.770	1	0.000	1.447
Quintiles (fourth)	0.476	0.002	71,042.242	1	0.000	**1.610**
Sector (craftsmen and workers)[a]			561,519.506	10	0.000	
Sector (legislators and executives)	1.149	0.003	159,618.686	1	0.000	3.154
Sector (science and technology)	0.952	0.003	110,283.122	1	0.000	2.592
Sector (healthcare)	1.306	0.004	120,547.392	1	0.000	3.691
Sector (education and training)	1.334	0.003	179,451.396	1	0.000	**3.795**
Sector (public administration)	1.085	0.002	191,525.753	1	0.000	2.960
Sector (information technology)	0.736	0.005	25,871.163	1	0.000	2.087
Sector (law, culture, sport)	1.084	0.004	87,242.931	1	0.000	2.956
Sector (officials)	1.212	0.004	110,169.115	1	0.000	3.360
Sector (services and sales)	0.526	0.002	104,783.778	1	0.000	1.691
Sector (agriculture, forestry, fishing)	0.320	0.002	19,749.771	1	0.000	1.377

Source: EU-SILC microdata (Eurostat, 2021), own processing using IBM SPSS Statistics

Note: [a] This parameter has been set to zero because it is redundant.

In all segments (Tab. 5–7) both differences and similarities were identified. The variable of Gender was confirmed as a significant variable influencing the fulfilment of the need for healthcare in all segments (while men's chances were always higher than women's).

For the factor of Household composition, single households falling into the first and third segments were least likely to have their needs for healthcare met. Single households were followed by households of single parents. In the second segment, however, single parents were are the most at-risk group. Households with two adults stood the best chances of having their healthcare needs met across the board.

In terms of economic activity, old-age pensioners in the third segment and employees in the first and second segments were most likely to have their healthcare needs fulfilled. In both of these segments, employees placed first and old-age pensioners second. This was probably due to the time constraints of economically active persons (especially self-employed entrepreneurs) on the one hand, and the ample free time of old-age pensioners on the other hand.

For the variable of Income quintile, respondents in the first three or four income quintiles were more likely to have their healthcare needs met compared to the fifth income quintile. This could be due to the busyness of the wealthiest respondents (who were often self-employed). In the first optimistic segment, the highest chances were the same for the first and second income quintiles, i.e., the odds were 1.6 times higher compared to the fifth quintile. In the neutral segment, the chances were highest in the third income quintile, i.e., 1.9 times higher than in the fifth quintile. In the third pessimistic segment, the highest chances were in the fourth quintile. From the first to the fourth quintile in this cluster, the probability

of meeting the need for healthcare rose with increasing income.

The last examined factor was the Sector of activity with the reference category of craftsmen and workers. Here, all other segments' chances of the fulfilment of the need for healthcare were higher than those of craftsmen and workers. It seemed that respondents from the agriculture sector falling into the second segment had lower chances of having their healthcare needs met, but the category turned out to be statistically insignificant. The highest chances had the 'legislators and executives' category from the first segment. This category was followed by the healthcare sector, where the chances of meeting the need for healthcare were the highest in the second segment. After the healthcare sector, the second segment had high chances of fulfilling the need for healthcare for respondents from the education sector. This sector was the strongest in the third segment, where the chances were almost four times higher compared to craftsmen.

The last analysis, which completed the comprehensive view of consumers' perception of the availability of healthcare, was a list of the most common reasons for not receiving the needed healthcare. The most common reasons for unmet healthcare needs and the countries with the highest frequencies of the respective reasons are shown in Tab. 8. Financial reasons were reported by 80% of the dissatisfied respondents from Belgium, Cyprus and Italy. Long waiting lists (long waiting times for appointments) as the reasons for unmet healthcare needs prevailed in Finland, Estonia and Slovenia.

Less frequent reasons were, for example, "I did not have time", "traffic problems", "I expected the improvement to come by itself" – these were closely interrelated and were considered more of a search for excuses for not

Tab. 8: Main reasons for non-fulfilment of healthcare needs

Reason	Countries where the reason for non-fulfilment of healthcare needs was reported the most		
It is expensive	Belgium, Cyprus, Italy: 80%	Greece: 75%	Portugal: 52%
Long waiting lists	Finland: 82%	Estonia, Slovenia: 78%	United Kingdom: 52%
Fear of examination	Czech Republic: 54%	France: 38%	Denmark: 33%

Source: EU-SILC microdata (Eurostat, 2021), own using IBM SPSS Statistics

seeking help and a guise for the main reason – fear. These reasons were given by respondents mainly from the Czech Republic, France and Denmark.

Discussion

The identification of segments of EU countries according to the perceived health status of consumers belonging to the countries has made it possible to summarise the results of the extensive data related to health from the EU-SILC survey. Three segments were identified and named optimistic, neutral and pessimistic according to their health assessment approach. In order to find out categories of socioeconomic and demographic factors that lead to the highest probability of meeting the healthcare need, the binary logistic regression was applied for each segment.

There are differences between the segments in terms of the effect of individual factors. For example, as for the factor of Education, high school students and respondents with primary education had the highest chances of having their healthcare needs fulfilled, while in the other two segments, the chances were the highest for respondents with primary education. This can be explained by the ample time available to old-age pensioners (who have typically attained less education than the current economically active population). Time-related reasons were also one of the most common reasons behind unmet healthcare needs.

The research has confirmed the conclusions by Roy and Chaudhuri (2008) and Socías et al. (2016) that gender was one of the major determinants of access to healthcare. In all segments, men were found to have higher chances of meeting their healthcare needs. In the second segment (neutral), which included most EU countries, men had 1.6 times higher chances than women. It turned out that women approached healthcare differently than men.

The Income Quintile variable was also found to be significant with respect to chances of meeting the need for healthcare in all segments. This finding corresponded to, for example, the study by Lenhart (2019). The presented research only partially confirm the statement by Knaul et al. (2012) who pointed out the situation of low-income households whose financial constraints limited the access to healthcare. Financial and time-related reasons are the most frequent reasons for not meeting the need of healthcare. However, in all segments in this paper, the chances were lowest for respondents in the fifth richest income quintile. Even in the first optimistic segment, the chances for meeting healthcare needs were highest in the first low-income segment. The highest-income respondents were usually self-employed who did not have enough time for seeking healthcare services. In the second segment, the chances were highest in the third quintile. In the third segment, the chances were highest in the fourth quintile. Apparently, the chances of meeting the need for healthcare are rising with increasing income but the situation is different for the fifth income quintile.

As for the Sector of activity variable, the results showed that in all segments, respondents working in the craftsmen and workers sector had the lowest chances of having their healthcare needs fulfilled. The highest chances were different in various segments. In the first optimistic segment, legislators and executives had the highest chances of having their healthcare needs met. In the second and third segments, the highest chances had the respondents working in the education sector and followed by healthcare sector.

The significance of the influence of the factor Household composition on the fulfilment of the healthcare need is confirmed as in the study by Radulescu et al. (2012). The lowest chances of meeting the need for healthcare had single households and single-parent households. Single-mother and single-father households were among those with the lowest chances of having their healthcare needs met, which corresponded to the study by Socías et al. (2016). The binary logistic regression results were also consistent with the findings by Atkinson and Marlier (2010), Hoeck et al. (2011), and Puciato et al. (2020). According to these authors, education, economic status, and income were the main factors influencing the fulfilment of the need for medical treatment.

Despite the prevailing good self-assessments of health by the EU-SILC survey respondents, some of them felt that their healthcare need has not been met. The most frequent reasons for this were the financial demands of healthcare (especially in Greece, Italy and Belgium) and time-related reasons, i.e., lack of time to secure the necessary healthcare or long waiting lists (especially in Finland and Estonia). The third most common

group of reasons for unmet healthcare needs were those related to fear of examination and hesitation (when people decide just to wait for their state of health to improve). These reasons were most common in the Czech Republic and France, probably due to insufficient health education. The most common reasons for unmet healthcare needs corresponded to those identified by Fiorillo (2020) and Popovic et al. (2017), who speak, in particular, of the financial and time demands of healthcare.

Conclusions

Respondents who took part in the 2017 EU-SILC Income and Living Conditions survey had a unique opportunity to express their perceptions of health status and availability of healthcare. The large data related to subjective perceptions of health by individuals in all EU countries were summarized using the cluster analysis. Three segments called 'optimistic', 'neutral', and 'pessimistic' were identified (the names chosen reflected how the respective European respondents perceived their health). Each European country was then assigned to one of the segments according to the prevailing individual respondents' assessments. The designations were also chosen with respect to the close link between the perception of health and the type of person and their approach to life. The 'optimistic' segment included countries where 70–80% of the population rated their health as good or very good. The 'neutral' segment included countries where about 50% of the population rated their health as good. And finally, the 'pessimistic' segment (which comprised the smallest number of countries) included countries where about 14% of individuals rated their health as poor or very poor.

The binary logistic regression was applied to find out which demographic and socioeconomic factors influence the fulfilment of the need for healthcare and which categories of these factors increase the chances of the fulfilment of the need. The binary logistic regression was performed for each of the three segments created based on respondents' perceptions of their health as a whole. The explained variable in the model has been the fulfilment of the need for healthcare. This variable took two values (fulfilment and non-fulfilment of the need). Demographic and socioeconomic factors (Gender, Education, Household composition,

Economic activity, Income quintile, and Sector of activity) entered the regression as explanatory variables. All explanatory variables were found to be significant and influence the fulfilment of the need for health. Differences between segments in the logistic regression were described in terms of the influence of categories of significant factors.

All the reasons for unmet healthcare needs given by the respondents are worth looking into and searching for solutions – such as healthcare system innovations, organizational changes, health education, prevention, etc. In countries where the need for healthcare was not fulfilled, it may be caused by poorly functioning healthcare systems. As for the time-related reasons, on the other hand, the problem may lie in a poor management. The results of the study can provide information for policy makers in the area of health protection in EU countries. Special attention should be paid by social and health policy makers to the vulnerable groups, especially single parents and single households (in terms of household composition), women (in terms of gender) and craftsmen and workers (in terms of sector of activity).

References

Atkinson, A., & Marlier, E. (2010). *Income and Living Conditions in Europe*. Luxembourg: Publications Office of the European Union.

Banthin, J., Cunningham, P., & Bernard, D. M. (2008). Financial Burden of Health Care, 2001–2004. *Health Affairs, 27*(1), 188–195. https://doi.org/10.1377/hlthaff.27.1.188

Blumberg, L., Waidmann, T. A., Blavin, F., & Roth, J. (2014). Trends in Health Care Financial Burdens, 2001 to 2009. *Milbank Quarterly, 92*(1), 88–113. https://doi.org/10.1111/1468-0009.12042

Borisova, L. V. (2019). Objective and subjective determinants of self-rated health in Central and Eastern Europe: a multilevel approach. *Central European Journal of Public Health, 27*(2), 145–152. https://doi.org/10.21101/cejph.a5226

Callander, E. J., Fox, H., & Lindsay, D. (2019). Out-of-pocket healthcare expenditure

in Australia: trends, inequalities and the impact on household living standards in a high-income country with a universal health care system. *Health Economics Review, 9*(1), 1–8. https://doi.org/10.1186/s13561-019-0227-9

Cazacu, L., & Oprescu, A. E. (2015). Healthcare Marketing – A Relational Approach. *Revista Economica, 67*(5), 59–72.

Chaupain-Guillot, S., & Guillot, O. (2015). Health system characteristics and unmet care needs in Europe: an analysis based on EU-SILC data. *The European Journal of Health Economics, 16,* 781–796. https://doi.org/10.1007/s10198-014-0629-x

Czibere, I., Rácz, A., Szilvási, H., Szikszai, Z., & Imre, S. (2019). Examination of life quality, mental conditions and cognitive status of people over the age of 90: Results of a Hungarian local research *Central European Journal of Public Health, 27*(1), 17–23. https://doi.org/10.21101/cejph.a4753

Eurostat. (2019). *EU statistics on income and living conditions (EU-SILC) methodology*. Retrieved September 16, 2021, from https://ec.europa.eu/eurostat/statistics-explained/index.php/EU_statistics_on_income_and_living_conditions_(EU-SILC)_methodology

Eurostat. (2021). *EU Statistics on Income and Living Conditions microdata 2004–2019*, *release 1 in 2021*. https://doi.org/10.2907/EUSILC2004-2019V.2

Fiorillo, D. (2020). Reasons for unmet needs for health care: the role of social capital and social support in some Western EU countries. *International Journal of Health Economics and Management, 20*(3), 79–98. https://doi.org/10.1007/s10754-019-09271-0

Hebák, P., Jarošová, E., Pecáková, I., Plašil, M., Řezanková, H., Vilikus, O., & Vlach, P. (2015). *Statistické myšlení a nástroje analýzy dat [Statistical thinking and data analysis tools]* (2nd ed.). Prague: Informatorium.

Hendl, J. (2006). *Přehled statistických metod [Overview of statistical methods]*. Prague: Portál.

Hoeck, S., Francois, G., Van der Heyden, J., Geerts, J., & Van Hal, G. (2011). Healthcare utilisation among the Belgian elderly in relation to their socioeconomic status. *Health Policy, 99*(2), 174–182. https://doi.org/10.1016/j.healthpol.2010.08.010

Jindrová, P., & Labudová, V. (2020). The Impact of Socio-economic and Demographic Determinants on Self-perceived Health. *E&M Economics and Management, 23*(4), 68–88. https://doi.org/10.15240/tul/001/2020-4-005

Kenkel, D. S. (1990). Consumer health information and the demand for medical care. *The Review of Economics and Statistics, 72*(4), 587–595.

Khan, M. A., & Ul Husnain, M. I. (2019). Is health care a luxury or necessity good? Evidence from Asian countries. *International Journal of Health Economics and Management, 19*(2), 213–233. https://doi.org/10.1007/s10754-018-9253-0

Kim, Y., Park, I., & Kang, S. (2018). Age and gender differences in health risk perception. *Central European Journal of Public Health, 26*(41), 54–59. https://doi.org/10.21101/cejph.a4920

Knaul, F. M., Wong, R., & Arreola-Ornelas, H. (2012). *Financing Health in Latin America: Household Spending and Impoverishment.* Cambridge, MA: Harvard Global Equity Initiative.

Kunzová, Š., & Hrubá, D. (2013). Health and behaviour Part I – Lifestyle and disease. *Hygiena, 58*(1), 23–28, https://doi.org/10.21101/hygiena.a0958

Lenhart, O. (2019). The effects of income on health: new evidence from the Earned Income Tax Credit. *Review of Economics of the Household, 17*(2), 377–410. https://doi.org/10.1007/s11150-018-9429-x

Mlčochová, V., & Papežová, K. (2012). Correlation of alcohol consumption and cigarette smoking. *General Practitioner/Prakticky Lekar, 92*(6), 339–341.

Morkevičius, V., Norkus, Z., & Markevičiūtė, J. (2020). Risky health behaviours and socioeconomic inequalities in European countries: new insights from European Social Survey. *Central European Journal of Public Health, 28*(4), 251–259. https://doi.org/10.21101/cejph.a6112

Peretti-Watel, P., Fresard, L., Bocquier, A., & Verger, P. (2016). Perceptions of cancer risk factors and socioeconomic status. A French study. *Preventive Medicine Reports, 3,* 171–176. https://doi.org/10.1016/j.pmedr.2016.01.008

Popovic, N., Terzic-Supic, Z., Simic, S., & Mladenovic, B. (2017). Predictors of unmet health care needs in Serbia; Analysis based on EU-SILC data. *PLoS ONE, 12*(11), 1–20. https://doi.org/10.1371/journal.pone.0187866

Puciato, D., Rozpara, M., Bugdol, M., Oleśniewicz, P., & Jáčová, H. (2020). Health-related Quality of Life and Socio-economic

Status of the Unemployed. *E&M Economics and Management, 23*(3), 23–37. https://doi.org/10.15240/tul/001/2020-3-002

Radulescu, V., Cetina, I., & Orzan, G. (2012). Key Factors that Influence Behavior of Health Care Consumer, the Basis of Health Care Strategies. *Contemporary Readings in Law, 4*(2), 992–1001.

Roy, K., & Chaudhuri, A. (2008). Influence of socioeconomic status, wealth and financial empowerment on gender differences in health and health care utilization in later life: evidence from India. *Social Science & Medicine, 66*(9), 1591–1962. https://doi.org/10.1016/j.socscimed.2008.01.015

Schmid, C. (2015). Consumer Health Information and the Demand for Physician Visits. *Health Economics, 24*(12), 1619–1631.

Schokkaert, E., Steel, J., & Van de Voorde, C. (2017). Out-of-Pocket Payments and Subjective Unmet Need of Healthcare. *Applied Health Economics and Health Policy, 15*(5), 545–555. https://doi.org/10.1007/s40258-017-0331-0

Socías, M. E., Koehoorn, M., & Shoveller, J. (2016). Gender Inequalities in Access to Health Care among Adults Livingin British Columbia, Canada. *Women's Health Issues, 26*(1), 74–79. https://doi.org/10.1016/j.whi.2015.08.001

Sonik, R. A., Creedon, T. B., Progovac, A. M., Carson, N., Delman, J., Delman, D., & Cook, B. L. (2020). Depression treatment preferences by race/ethnicity and gender and associations between past healthcare discrimination experiences and present preferences in a nationally representative sample. *Social Science & Medicine, 253,* 112939. https://doi.org/10.1016/j.socscimed.2020.112939

World Health Organization. (2006). *Constitution of the World Health Organization*. Retrieved March 16, 2022, from https://www.who.int/governance/eb/who_constitution_en.pdf