Artur Czech[a]
Teresa Słaby[b]

Factors affecting the quality of life of urban households in Poland, excluding households located in the capitals of voivodships

1. Introduction

Consumerism is perceived as one of the features defining the human being of the 21st century (Mróz, 2013, p. 51), leading to psychological consequences for an individual's identity, sense of self-worth, happiness, and psychological well-being (Zawadzka & Górnik-Durose, 2010, p. 8). It is also strictly connected with the category of quality of life, which varies with place (Słaby, 2011, p. 12). Therefore, in comparative studies, the concept of quality of life is very often used as one of the elements of social development assessment (Andersson, 2008; Savoia et al., 2006; Ståhl et al., 2003).

Poland's accession to the European Union created new opportunities for levelling the increasing disparities, both in the sphere of social development and quality of life. Nevertheless, there are still comparatively large social and economic differences among Polish regions. The assessment of the development level in the context of the structure of consumption in particular voivodships, excluding capital cities, proved that the objectively-evaluated satisfaction of needs is highly overestimated (Czech & Słaby, 2017). This situation is caused by the fact that the capitals of voivodships play the role of growth poles. Moreover, the majority of the best-paid professions are available in the largest urban agglomerations (Kozera et al., 2014), which affects the development level of particular regions of the country (Madras & Mitura, 2014). Researchers focus on capitals of voivodships, for example in the context of spatial management (Hajduk, 2018) or quality of life in urban areas (Maggino, 2006). The above studies contributed to a comparatively highly insightful analysis of the living standards of urban households of particular voivodships, excluding those located in capital cities, (Czech, 2017b). In result, the aforementioned analyses used objective measures, which are strictly connected with measuring living standards.

[a] Warsaw Management University, Institute of Management and Technical Science.
  ORCID: https://orcid.org/0000-0003-4854-1466.
[b] Warsaw Management University, Institute of Management and Technical Science.
  ORCID: https://orcid.org/0000-0002-9354-8571.

It is necessary to make a reliable diagnosis of the main factors (determinants) influencing geographical disparities in the sphere of quality of life in particular urban areas with the use of subjective measures. This is due to the fact that economic decisions and consumption still depend on the regional situation and the subjective evaluation of the current and future situation of households (Kusińska, 2011, p. 128). Additionally, the quality of life of urban citizens has a substantial impact on urban policies, planning, and public activity (Dahmann, 1985).

The main goal of this study is to determine what influence the degree of the satisfaction of selected groups of needs of urban households located outside the voivodship capital cities has on the general subjective evaluation, which is the main determinant of quality of life. Additionally, the authors proposed a research hypothesis saying that a subjective assessment of the general household situation, being one of the main components of the process of measuring quality of life, is strongly determined by the geographical location of urban households. The paper is based on a literature review as well as on data obtained from the household budget survey carried out in 2016 by Statistics Poland.

2. Methodological aspects of the research on quality of life and the construction of diagnostic variables

The question concerning the definition of quality of life can be found as early as in ancient literature, starting from Aristotle (Nordenfelt, 1993, p. 4). The conducted literature review showed that the concept of quality of life is used for different purposes and contributes to different conclusions. This results from the lack of a standard definition of quality of life in the literature concerning this subject (Panek, 2015b, p. 8). Research on this matter is undertaken by representatives of different academic and professional domains, including physicians, psychologists, sociologists and politicians. The precursor of the concept of quality of life was Jeremy Bentham, who in 1791 proposed the assessment of the human life situation by comparing pains and pleasures (Bentham, 1982, p. 43). On the other hand, the term 'quality of life' is very often treated as a synonym of the term 'living standard' (Ostasiewicz, 2002, p. 9). Such a perception results from two different approaches to the concept of quality of life present in literature (Panek, 2016, pp. 14–18).

As Malina & Zeliaś (1997, p. 238) indicate, quality of life should reflect the relativity of the widely-understood non-material needs. According to the authors, this category measures the level of satisfaction an individual gains from different spheres of life or areas of activity. Consequently, quality of life is considered a multidimensional category, which is emotionally charged and, in many cases, takes the form of an ideological tool (Adamiec & Popiołek, 1993, p. 93).

According to one of the definitions of quality of life, it is a research category understood as the subjective perception of one's life within a certain system of values

and under specific social, economic and political conditions (Rogala, 2009, p. 7). The first attempt at distinguishing between the concepts of living standard and quality of life as separate research categories was undertaken by Słaby (Słaby, 1990, p. 25). The author defined living standard as the degree of satisfaction of material and cultural needs in the context of the existing infrastructure that makes it possible to satisfy those needs; and quality of life as subjective emotional states which are dependent on the degree of satisfaction of the existing needs, or on living under certain external conditions. The author's subsequent work was also focused on the notion of quality of life, as well as on the concept of dignity of life (Słaby, 2012, p. 11).

A similar approach to the definition of living standard and quality of life is presented by Owsiński and Tarchalski (2008). These authors believe that one's living standard is determined by objective conditions of life, while life quality is influenced by subjective factors, such as aspirations or the level of one's satisfaction or perception (Owsiński & Tarchalski, 2008, p. 62). Literature review proves that both Polish (Bąk & Szczecińska, 2015; Sompolska-Rzechuła, 2017) and foreign authors (Maggino, 2013; Xing & Chu, 2012) combine subjective and objective elements in their research on quality of life. The complexity and diversity of research approaches to this concept have been extensively presented in the literature, e.g. by Gierańczyk & Leszczyńska (2019). These authors emphasise the multidimensional character of the 'quality of life' category and the lack of one binding definition, which results in different ways of measuring it.

The previous considerations strongly suggest that regardless of how quality of life is defined, its assessment should include a subjective element. Quality of life is not directly observable, and its evaluation is usually carried out on the basis of the Likert scale. This is due to the fact that all factors determining inhabitants' quality of life should be assessed by people themselves rather than by officials or politicians (Ostasiewicz, 2006, p. 8).

According to Statistics Poland and the recommendations of both the Stiglitz' Report and the European Statistical System (Panek, 2015a), the multifaceted character of the 'quality of life' concept should be taken account of in the measurement process, and so should be the subjective quality of life, which is alternatively referred to as 'subjective well-being' (Szukiełojć-Bieńkuńska et al., 2014, p. 24). Subjective indicators which are difficult to measure and which reflect human feelings in relation to their lives and satisfaction are used in the process of measuring quality of life (Gotowska, 2014, p. 38). Thus, subjective measurement is conducted by means of directly declared assessments and feedback from respondents relating to the level of satisfaction with different spheres of life (Sompolska-Rzechuła, 2013).

Literature relating to the analysed subject shows that the subjective assessment of quality of life remains in the centre of researchers' interest, especially with regard to urban areas (Low et al., 2018). Every aspect relating to quality of life is considered as

a multidimensional category and requires appropriate statistical tools, like logistic regression, whose implementation enables carrying out a relative impact analysis of several diagnostic features on one dichotomous variable. Its independent variables (factors) can be both qualitative and quantitative, and the possibility of interpreting the results of the estimation in a way resembling the classical regression analysis is an additional advantage here (Stanisz, 2007, p. 217). Logistic regression models are widely applied in medical sciences and have also been introduced to economics in the area of quality of life (Główny Urząd Statystyczny & Urząd Statystyczny w Łodzi, 2013, 2017).

Further research was carried out in relation to the marginalisation and social exclusion of indigenous rural natives, poverty measurement (Słaby, 2016, pp. 98–102), national wealth (Sączewska-Piotrowska, 2015), and the assessment of the quality of life of the emerging upper class (Kot & Słaby, 2013). Regional differences in the perception of quality of life have already been analysed according to its particular determinants in all Polish voivodships (Czech, 2017a; Czech & Słaby, 2018).

The basis for the analysis performed in this study of the influence of selected groups of needs on urban households' general situation (which is one of the determinants of quality of life), was the results of household budget surveys conducted by Statistics Poland. The assessment of the general situation was carried out by means of the five-step Likert scale, where the following values denoted the following categories: 1 – 'good', 2 – 'rather good', 3 – 'average (neither good nor bad)', 4 – 'rather bad', 5 – 'bad'. The subjective assessment of the degree of satisfaction with food and clothing, footwear needs, furnishing and durable goods were measured using the same scale with the same categories attached to the same values. The degree of satisfaction of the following needs was also measured on the same scale:

- healthcare, i.e. doctor's visits, purchase of medications, payment for treatments, etc.;
- making due payments on time, including fixed payments, rent, bills, etc.;
- culture, i.e. the purchase of books (excluding school textbooks), magazines, tickets to concerts, cinemas and theatres;
- education, workshops and courses, including the purchase of textbooks;
- tourism and leisure outside the place of residence, e.g. holidays.

The respondents were, however provided with one more option – number 6, which meant 'not applicable' or 'lack of need', marked in cases where no answer was given to the question regarding a particular household need. The above-listed factors, capable of influencing the quality of life of urban households, are connected both with tangible and intangible goods or services that additionally have a strong influence on the European Union member states' economies (Skąpska, 2015, 2016, p. 405).

A logistic regression model was constructed in order to evaluate the influence of the level of satisfaction of selected needs on the subjective perception of the general

situation of urban households. What is interesting here is that the model takes the cause-and-effect form with one explained variable and a set of explanatory variables. It was carried out with the use of the zero-one feature, also known as binary. The variable assumes the value '1' when the respondent describes the situation of a household as 'very good' or 'good', and the value '0' in the case of the remaining choices.

The described variables (the subjective assessment of the satisfaction of particular groups of needs) were classified as: 'good' and 'rather good', 'average (neither good nor bad)', 'rather bad', and 'bad'. The answer 'does not concern' or 'lack of such a need' were added to the category 'neither good nor bad'.

Such an approach allowed a significant reduction in the final set of diagnostic variables, as logistic regression requires qualitative variables which should be consistent with the zero-one system. This kind of transformation assumes that the feature having m variants is presented as $m - 1$ of zero-one variables. Thus, each of the eight groups of needs was represented by two artificial explanatory variables, which led to constructing the set of sixteen diagnostic variables. The procedure of the transformation of qualitative variables into artificial ones is referred to as coding. It requires, however, the determination of a reference category. This category consists of respondents whose answer to specific questions about the satisfaction level of particular needs was 'rather bad' or 'bad'. It is worth mentioning here that the literature on the subject offers also other types of coding (parametrisation) (Książek, 2012, p. 47–50).

As a result of the coding transformation, the following set of independent potential variables was used:

$X_1 = 1$ – the respondent assessed the level of satisfaction with the household's needs of food as 'good' and 'rather good'; $X_1 = 0$ – for the remaining answers;

$X_2 = 1$ – the respondent assessed the level of satisfaction with the household's needs of food as 'average (neither good nor bad)'; $X_2 = 0$ – for the remaining answers;

$X_3 = 1$ – the respondent assessed the level of satisfaction with the household's needs of clothing and footwear as 'good' and 'rather good'; $X_3 = 0$ – for the remaining answers;

$X_4 = 1$ – the respondent assessed the level of satisfaction with the household's needs of clothing and footwear as 'average (neither good nor bad)'; $X_4 = 0$ – for the remaining answers;

$X_5 = 1$ – the respondent assessed the level of satisfaction with the household's health needs as 'good' and 'rather good'; $X_5 = 0$ – for the remaining answers;

$X_6 = 1$ – the respondent assessed the level of satisfaction with the household's health needs as 'average (neither good nor bad)'; $X_6 = 0$ – for the remaining answers;

$X_7 = 1$ – the respondent assessed the level of satisfaction with the household's needs related to paying bills on time as 'good' and 'rather good'; $X_7 = 0$ – for the remaining answers;

$X_8 = 1$ – the respondent assessed the level of satisfaction with the household's needs related to paying bills on time as 'average (neither good nor bad)'; $X_8 = 0$ – for the remaining answers;

$X_9 = 1$ – the respondent assessed the level of satisfaction with the household's needs related to furniture and durable goods as 'good' and 'rather good'; $X_9 = 0$ – for the remaining answers;

$X_{10} = 1$ – the respondent assessed the level of satisfaction with the household's needs related to furniture and durable goods as 'average (neither good nor bad)'; $X_{10} = 0$ – for the remaining answers;

$X_{11} = 1$ – the respondent assessed the level of satisfaction with the household's cultural needs as 'good' and 'rather good'; $X_{11} = 0$ – for the remaining answers;

$X_{12} = 1$ – the respondent assessed the level of satisfaction with the household's cultural needs as 'average (neither good nor bad)'; $X_{12} = 0$ – for the remaining answers;

$X_{13} = 1$ – the respondent assessed the level of satisfaction of the household's needs of education, participating in workshops and courses as 'good' and 'rather good'; $X_{13} = 0$ – for the remaining answers;

$X_{14} = 1$ – the respondent assessed the level of satisfaction with the household's needs of education, participating in workshops and courses as 'average (neither good nor bad)'; $X_{14} = 0$ – for the remaining answers;

$X_{15} = 1$ – the respondent assessed the level of satisfaction of the household's needs in the area of tourism and leisure as 'good' and 'rather good'; $X_{15} = 0$ – for the remaining answers;

$X_{16} = 1$ – the respondent assessed the level of satisfaction with the household's needs in the area of tourism and leisure as 'average (neither good nor bad)'; $X_{16} = 0$ – for the remaining answers.

It should be noted that all the potential diagnostic features were put under statistical investigation through a correlation analysis, which involves the implementation of several methods, one of which is the review of correlation matrices. For this purpose, contingency tables were used, serving as the basis for the construction of Yule's correlation coefficient (Stanisz, 2006, p. 325). Table 1 presents the results of this analysis that involved a selection of diagnostic features.

Table 1. Yule's correlation coefficients among independent variables

Research objects	Selected pairs of independent variables							
	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}/X_{16}
Poland	−0.94	−0.85	−0.81	−0.90	−0.77	−0.60	−0.95	−0.48
Dolnośląskie voivodship	−0.93	−0.84	−0.83	−0.89	−0.79	−0.66	−0.96	−0.58
Kujawsko-Pomorskie voivodship	−0.91	−0.86	−0.78	−0.85	−0.78	−0.59	−0.94	−0.36
Lubelskie voivodship	−0.95	−0.84	−0.79	−0.90	−0.76	−0.56	−0.95	−0.37
Lubuskie voivodship	−0.95	−0.79	−0.75	−0.88	−0.68	−0.57	−0.97	−0.44
Łódzkie voivodship	−0.96	−0.88	−0.83	−0.95	−0.77	−0.51	−0.97	−0.41
Małopolskie voivodship	−0.94	−0.89	−0.85	−0.91	−0.82	−0.65	−0.96	−0.53
Mazowieckie voivodship	−0.94	−0.85	−0.80	−0.88	−0.75	−0.53	−0.93	−0.45
Opolskie voivodship	−0.94	−0.84	−0.83	−0.93	−0.81	−0.74	−0.97	−0.62
Podkarpackie voivodship	−0.94	−0.82	−0.79	−0.92	−0.73	−0.48	−0.94	−0.37
Podlaskie voivodship	−0.94	−0.81	−0.80	−0.91	−0.76	−0.68	−0.97	−0.55
Pomorskie voivodship	−0.94	−0.86	−0.82	−0.89	−0.73	−0.61	−0.96	−0.51
Śląskie voivodship	−0.93	−0.86	−0.81	−0.88	−0.82	−0.67	−0.97	−0.57
Świętokrzyskie voivodship	−0.95	−0.90	−0.85	−0.94	−0.82	−0.59	−0.98	−0.36
Warmińsko-Mazurskie voivodship ..	−0.94	−0.82	−0.78	−0.90	−0.71	−0.53	−0.95	−0.37
Wielkopolskie voivodship	−0.92	−0.83	−0.79	−0.90	−0.76	−0.59	−0.93	−0.48
Zachodniopomorskie voivodship	−0. 97	−0.84	−0.81	−0.96	−0.74	−0.52	−0.94	−0.38

Source: authors' work.

The analysis of the data presented in the table above showed high absolute values of Yule's correlation coefficients within each group of needs. This phenomenon is observed both in all urban households in Poland and in their particular subpopulations, in this case voivodships. As a result, the following variables were not subject to further analysis: X_2, X_4, X_6, X_8, X_{10}, and X_{14}. In the case of these features, the respondents assessed satisfying needs as 'average' or the need did not occur.

To sum up, the set of the remaining (not eliminated) diagnostic features provided the basis for the estimation process of logistic regression models.

3. The logistic regression approach to analysing urban households' quality of life

Research on quality of life requires a multidimensional approach and an empirical diagnosis. Logistic regression can be considered as an appropriate mathematical model, which allows the determination of the influence of a set of diagnostic variables on a dichotomous dependent variable.

The logit transformation is based on probability $P = P(Y = 1)$. It is expressed by the following formula:

$$\ln \frac{P(A)}{1 - P(A)} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k, \qquad (1)$$

where 'good' and 'rather good' relate to the opinion about the general subjective situation of the household; it is denoted by A and represents $P(A)$, i.e. the probability of an event occurring.

The natural logarithm of the expression $\frac{P(A)}{1-P(A)}$ is called a logit. It takes the form of a linear function of a set of the following explanatory variables: $X1, X2 \ldots, Xk$. Thus, the chosen parameter β_i is interpreted as an increase in the logarithm of the probability ratio. It is caused by a unit increase of the chosen variable Xj, assuming a controlled stability of the other variables included in the constructed model.

The hypothesis assuming that the explanatory variable does not influence the probability of an event can be assessed with the following Wald formula:

$$W = \left(\frac{\hat{\beta}}{S(\hat{\beta}_j)} \right)^2, \qquad (2)$$

where:
$\hat{\beta}_j$ – the value of the estimated parameter,
$S(\hat{\beta}_j)$ – an error in the parameter estimation.

The Wald statistics, when $H_0: \beta_j = 0$, is characterised by an X^2 distribution with one number of degrees of freedom. A high value of the Wald statistics weakens hypothesis H_0. The critical level is calculated as $p = p\left(X^2_{(1)} \geq W\right)$.
The main concern during the interpretation process of the results of the analysis regards the odds ratio. Three main cases in relation to the value of the odds ratio may occur. If the odds ratio remains below 1, it means that a factor described by explanatory variable H_j decreases the probability of the occurrence of the studied event. The odds ratio equalling 1 means that the probability of the occurrence of the studied event is the same in each group of needs. In the third case, where the odds ratio exceeds 1, the factor of the quality of life described by variable H_j increases the probability of the occurrence of the event (Stanisz, 2016, p. 196).

The evaluation of the factors of quality of life of urban households in particular voivodships was carried out using the logistic regression model for all urban households in Poland. The results of the calculations are presented in Table 2.

Table 2. Results of the estimation process of logistic regression for all urban households in Poland

Parameters of the logistic regression model	Independent variables									
	X_1	X_3	X_5	X_7	X_9	X_{11}	X_{12}	X_{13}	X_{15}	X_{16}
First stage										
Structural parameter $\hat{\beta}_i$	0.813	0.925	0.195	0.290	0.480	1.015	0.363	–0.100	1.530	0.561
Standard deviation $S(\beta_i)$	0.107	0.083	0.067	0.105	0.059	0.093	0.086	0.053	0.079	0.071
Critical level of significance P	0.000	0.000	0.004	0.006	0.000	0.000	0.000	0.059	0.000	0.000
Wald statistics W	57.475	124.209	8.475	7.607	66.971	120.245	17.730	3.578	373.613	63.055
Odds ratio $e^{\hat{\beta}_i}$	2.255	2.523	1.216	1.337	1.616	2.758	1.437	0.905	4.619	1.752
Second stage										
Structural parameter $\hat{\beta}_i$	0.809	0.919	0.188	0.288	0.479	1.004	0.361	*	1.523	0.564
Standard deviation $S(\beta_i)... S(\hat{\beta}_j)$	0.107	0.083	0.066	0.107	0.059	0.092	0.086	*	0.079	0.071
Critical level of significance P	0.000	0.000	0.005	0.007	0.000	0.000	0.000	*	0.000	0.000
Wald statistics W	56.93	123.24	8.02	7.20	66.60	118.38	17.64	*	371.47	63.77
Odds ratio $e^{\hat{\beta}_i}$	2.247	2.508	1.207	1.334	1.614	2.728	1.435	*	4.584	1.757

Note. * – statistically insignificant.

Source: authors' work.

It should be noted that the estimation was carried out in two stages. The first stage presents the entire potential set of diagnostic variables which were taken into account. Not all of the analysed variables were statistically significant – variable X_{13} is considered statistically insignificant and should be removed from the constructed model.

Subsequently, the second model of the logistic regression was estimated and the results of the calculations are also given in Table 2. In presenting the results, particular attention was devoted to the interpretation of the chance of occurrence – the odds ratio. What could be observed here is that regardless of how strongly the satisfaction of particular needs influences the subjective assessment of the general situation of urban households, the effect is positive.

The results of the analysis demonstrate that the satisfaction of tourism- and leisure-related needs is the most significant feature. It can be observed that with regard to the respondents who assessed the level of their satisfaction with this type of needs as 'good' and 'rather good', the odds ratio of feeling positive about the household's situation is higher by 458% compared to the reference group. Furthermore, satisfying households' cultural needs is second on the scale of importance, which is indicated by the value of the quotient of chances reaching 237%. The third group of significant needs is connected with clothing and footwear.

In conclusion, the analysis of quality of life carried out for all urban households in Poland has created a foundation for further geographical analysis of this phenomenon. As Poland is highly varied in terms of the inhabitants' assessment of their quality of life, performing separate analyses for each voivodships seemed essential. The results of the estimation process of logistic regression for particular voivodships are presented in Table 3.

Table 3. Odds ratios – the impact of diagnostic variables on the dependent variable – 0.05 level of significance

Voivodships	Independent variables								
	X_1	X_3	X_5	X_7	X_9	X_{11}	X_{12}	X_{15}	X_{16}
Dolnośląskie	*	4.391	*	4.072	*	2.309	*	2.447	*
Kujawsko-Pomorskie	15.162	*	*	*	2.822	*	*	5.549	*
Lubelskie	*	6.714	*	*	*	3.352	*	*	*
Lubuskie	*	*	*	9.220	*	9.220	*	12.461	5.132
Łódzkie	*	*	*	*	3.053	4.019	*	5.921	*
Małopolskie	*	3.262	*	*	2.181	*	*	2.640	*
Mazowieckie	2.136	2.829	*	*	1.797	1.884	*	5.496	2.360
Opolskie	*	*	*	*	3.408	*	*	15.602	5.559
Podkarpackie	*	3.237	3.343	*	2.569	*	*	6.750	*
Podlaskie	*	*	24.508	*	*	*	*	5.483	*
Pomorskie	3.864	2.588	*	*	2.095	5.461	2.373	3.841	2.068
Śląskie	2.651	2.101	*	*	1.880	3.398	1.816	4.994	1.781
Świętokrzyskie	*	*	*	*	*	10.595	*	4.041	*
Warmińsko-Mazurskie	*	6.751	*	*	*	2.148	*	9.769	*
Wielkopolskie	*	5.161	*	*	*	2.334	*	6.271	2.391
Zachodniopomorskie	*	10.691	*	*	2.928	*	*	7.884	*

Note. As in Table 2.

Source: authors' work.

The analysis of the data presented in the above table allows the indication of some trends connected with the assessment of quality of life in terms of the degree of satisfaction of particular groups of household needs.

It should be noted that the implemented diagnostic variables reflecting the level of satisfaction of needs in the area of education and health do not have a significant impact on the subjective perception of the general situation of urban households, and was regarded satisfactory in most voivodships.

A further interpretation of the results leads to the conclusion that the odds ratios are statistically insignificant for variables connected with tourism and leisure in particular voivodships. However, the odds ratio for Dolnośląskie voivodship indicates a higher chance (by 245% compared to the reference group) for the occurrence of respondents who assessed the level of their satisfaction of these needs as 'good' and 'rather good'.

To sum up, the performed analysis proved that many of the diagnostic variables which were used in the construction of the logistic regression model can be considered

statistically insignificant. In order to improve the constructed models of logistic regressions for particular voivodships, a new, acceptable level of significance was introduced. Consequently, new logistic regression models for particular voivodships were estimated, and the results are presented in Table 4.

Table 4. Odds ratios – the impact of diagnostic variables on the dependent variable – 0.1 level of significance

Voivodships	Independent variables									
	X_1	X_3	X_5	X_7	X_9	X_{11}	X_{12}	X_{13}	X_{15}	X_{16}
Dolnośląskie	*	3.806	*	3.701	1.538	2.110	*	*	2.271	*
Kujawsko-Pomorskie	11.177	*	2.115	*	2.248	*	*	*	5,332	*
Lubelskie	3.032	4.619	*	*	*	3.327	*	*	*	*
Lubuskie	*	*	*	9.313	*	11.846	3.088	*	9.435	3.493
Łódzkie	*	2.658	*	*	1.832	3.119	*	*	10.217	2.199
Małopolskie	*	2.603	1.762	*	1.983	2.159	*	0.699	1.852	*
Mazowieckie	2.136	2.829	*	*	1.797	1.884	*	*	5.496	2.360
Opolskie	4.043	2.745	*	*	2.479	*	*	0.595	10.270	3.891
Podkarpackie	3.064	2.438	2.962	*	2.366	*	*	*	6.909	*
Podlaskie	9.906	10.302	*	*	*	*	*	*	5.128	*
Pomorskie	3.864	2.588	*	*	2.095	5.461	2.373	*	3.841	2.068
Śląskie	2.463	1.932	1.343	*	1.820	3.247	1.789	*	4.928	1.791
Świętokrzyskie	*	*	*	*	*	4.772	*	*	32.799	14.046
Warmińsko-Mazurskie	*	6.751	*	*	*	2.148	*	*	9.769	*
Wielkopolskie	*	4.636	*	*	*	4.241	1.988	*	5.453	2.011
Zachodniopomorskie ...	*	10.691	*	*	2.928	*	*	*	7.884	*

Note. As in Table 2.

Source: authors' work.

The data presented in the above table allow several conclusions when identifying and observing the quality of life determinants of urban households. In general, the amount of statistically significant variables influencing the overall urban household situation increased. The need of paying bills on time is statistically insignificant in all of the analysed voivodships except Dolnośląskie and Lubuskie. Compared to other features, the health area is also statistically insignificant in most of the analysed voivodships.

4. Conclusions

The conducted research regarding urban households' subjective evaluation of the satisfaction of their needs as a measure of quality of life carried out by means of logistic regression led to several conclusions.

The modelling process involving the implementation of binominal logistic regression should be preceded by a correlation test. Special attention should be devoted to the correlation in the area of variables which were created with categories related to particular group of needs.

Regardless of how strong the influence of a particular group of needs is on the subjective assessment, the effect is positive, which means that the satisfaction of each of the distinguished groups of needs increases the overall subjective assessment (the main factor measuring quality of life and differentiating regions from one another).

On the one hand, coded variables connected to education, workshops and courses are not statistically significant in the case of urban areas both for the whole of Poland and for particular voivodships. On the other hand, the highest values of odds ratios are observed among respondents who assessed the fulfilment of their needs in the area of tourism and leisure as 'good' and 'very good' in all Polish urban households, excluding those located in the capitals of voivodships.

Furthermore, features connected with the fulfilment of needs relating to clothing and footwear, culture and equipping an apartment with durable goods, are considered the next most important determinants of quality of life.

It should also be noted that the variable describing the satisfaction of needs in the area of paying bills on time is statistically insignificant in most subpopulations, except for Dolnośląskie and Lubuskie voivodships.

An increase in the significance level of the estimated parameters of the logistic regression influences the number of explanatory variables in selected voivodships in the area of healthcare.

Different groups of needs are determined by the logit models of the general situation of urban households in particular regions.

To sum up, there is evidence supporting the proposed hypothesis which assumed that the subjective assessment of households' general situation constituting the main component of quality of life is strongly determined by the geographical diversity of urban households.

References

Adamiec, M., & Popiołek, K. (1993). Jakość życia – między wolnością a mistyfikacją. *Ruch Prawniczy, Ekonomiczny i Socjologiczny*, *55*(2), 93–102.

Andersson, P. (2008). Happiness and health: Well-being among the self-employed. *The Journal of Socio-Economics*, *37*(1), 213–236. https://doi.org/10.1016/j.socec.2007.03.003.

Bąk, I., & Szczecińska, B. (2015). Jakość życia w ujęciu obiektywnym w województwach Polski. Analiza porównawcza. *Folia Pomeranae Universitatis Technologiae Stetinensis*, (3), 15–26. http://www.wydawnictwoold.zut.edu.pl/files/magazines/2/57/730.pdf.

Bentham, J. (1982). *An Introduction to the Principles of Morals and Legislation*. London: Methuen.

Czech, A. (2017a). Ocena jakości życia polskich gospodarstw domowych – ujęcie wojewódzkie. In E. Frątczak, T. Panek & T. Słaby (Eds.), *Paradygmaty badawcze jakości życia w ekonomii, zarządzaniu i psychologii* (pp. 49–64). Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego.

Czech, A. (2017b). Poziom życia miejskich gospodarstw domowych w Polsce poza krajowymi ośrodkami rozwoju. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego*

w Katowicach, (326), 30–40. https://www.ue.katowice.pl/fileadmin/user_upload/wydawnictwo/SE_Artyku%C5%82y_321_340/SE_326/03.pdf.

Czech, A., & Słaby, T. (2017). Ocena poziomu życia gospodarstw domowych według województw – meandry analizy taksonomicznej. *Wiadomości Statystyczne*, *62*(10), 19–37. https://doi.org/10.5604/01.3001.0014.1054.

Czech, A., & Słaby, T. (2018). Ocena determinant jakości życia gospodarstw domowych województwa kujawsko-pomorskiego. In M. Geise, D. Piotrowski & J. Oczki (Eds.), *Zrównoważony rozwój województwa kujawsko-pomorskiego. Bariery i wyzwania* (pp. 49–64). Wrocław: Narodowy Bank Polski, Polskie Towarzystwo Statystyczne.

Dahmann, D. C. (1985). Assessment of neighborhood quality in metropolitan America. *Urban Affairs Review*, *20*(4), 511–535. https://doi.org/10.1177/004208168502000407.

Gierańczyk, W., & Leszczyńska, M. (2019). Ujęcie szczęścia w wielowymiarowych badaniach jakości życia. *Wiadomości Statystyczne. The Polish Statistician*, *64*(1), 52–67. https://doi.org/10.5604/01.3001.0013.8542.

Główny Urząd Statystyczny & Urząd Statystyczny w Łodzi. (2013). *Jakość życia, kapitał społeczny, ubóstwo i wykluczenie społeczne w Polsce*. Warszawa. https://stat.gov.pl/download/cps/rde/xbcr/gus/WZ_jakosc_zycia_2013.pdf.

Główny Urząd Statystyczny & Urząd Statystyczny w Łodzi. (2017). *Jakość życia w Polsce w 2015 r. Wyniki Badania Spójności Społecznej*. Warszawa. https://stat.gov.pl/files/gfx/portalinformacyjny/pl/defaultaktualnosci/5486/4/2/1/jakosc_zycia_w_polsce_w_2015_roku.pdf.

Gotowska, M. (2014). Jakość życia, poziom jakości życia, równowaga bytu – dyskusja trwa. *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania*, *37*(2), 33–43.

Hajduk, S. (2018). Instrumenty zarządzania przestrzennego w aspekcie zrównoważonego rozwoju – wielowymiarowa analiza porównawcza miast wojewódzkich. *Annual Set The Environment Protection / Rocznik Ochrona Środowiska*, *20*(2), 1219–1233. https://ros.edu.pl/images/roczniki/2018/072_ROS_V20_R2018.pdf.

Kot, M. S., & Słaby, T. (2013). Ocena jakości życia wschodzącej klasy wyższej w Polsce. *Śląski Przegląd Statystyczny / Silesian Statistical Review*, (11), 209–227.

Kozera, A., Stanisławska, J., & Wysocki, F. (2014). Sytuacja finansowa gospodarstw domowych zamieszkujących obszary wiejskie w Polsce po wstąpieniu Polski do Unii Europejskiej. *Roczniki Naukowe Ekonomii Rolnictwa i Rozwoju Obszarów Wiejskich*, *101*(2), 91–101. http://sj.wne.sggw.pl/pdf/RNR_2014_n2_s91.pdf.

Książek, M. (2012). Analiza danych jakościowych. In E. Frątczak (Ed.), *Zaawansowane metody analiz statystycznych* (pp. 25–138). Warszawa: Oficyna Wydawnicza SGH.

Kusińska, A. (Ed.). (2011). *Konsumpcja a rozwój społeczno-gospodarczy regionów w Polsce*. Warszawa: Polskie Wydawnictwo Ekonomiczne.

Low, C. T., Stimson, R., Chen, S., Cerin, E., Pui-Yun Wong, P., & Lai, P. C. (2018). Personal and Neighbourhood Indicators of Quality of Urban Life: A Case Study of Hong Kong. *Social Indication Research*, *136*(2), 751–773. https://doi.org/10.1007/s11205-017-1579-3.

Madras, T., & Mitura, M. (2014). Dochody własne miast wojewódzkich w analizie ich kondycji finansowej. *Ekonomia i Zarządzanie*, *6*(4), 123–134. http://doi.org/10.12846/j.em.2014.04.09.

Maggino, F. (2006). Definition and analysis of subjective indicators of urban quality-of-life in an 'atypical' city. In W. Ostasiewicz (Ed.), *Towards quality of life improvement* (pp. 168–218). Wrocław: The Publishing House of the Wroclaw University of Economics.

Maggino, F. (2013). The construction on well-being indictors: from definitions to measures and to interpretation. *Śląski Przegląd Statystyczny / Silesian Statistical Review*, (11), 95–122.

Malina, A., & Zeliaś, A. (1997). O budowie taksonomicznej miary jakości życia. *Taksonomia*, (4), 238–263.

Mróz, B. (2013). *Konsument w globalnej gospodarce: Trzy perspektywy*. Warszawa: Oficyna Wydawnicza SGH.

Nordenfelt, L. (1993). *Quality of life, health and happiness*. Averbury: Ashgate Publishing. http://www.diva-portal.org/smash/get/diva2:17056/FULLTEXT01.pdf.

Ostasiewicz, W. (Ed.). (2002). *Metodologia pomiaru jakości życia*. Wrocław: Wydawnictwo Akademii Ekonomicznej im. Oscara Langego.

Ostasiewicz, W. (Ed.). (2006). *Towards Quality of Life Improvement*. Wrocław: The Publishing House of the Wrocław University of Economics.

Owsiński, J. W., & Tarchalski, T. (2008). Pomiar jakości życia. Uwagi na marginesie pewnego rankingu. *Współczesne Problemy Zarządzania*, (1), 59–96. https://www.wit.edu.pl/dokumenty /wydawnictwa_naukowe/zeszyty_naukowe_WITZ_01/owsinski-tarchalski.pdf.

Panek, T. (2015a). Hierarchiczny model pomiaru jakości życia. *Wiadomości Statystyczne*, *60*(6), 1–22.

Panek, T. (2015b). *Jakość życia gospodarstw domowych w Polsce w układzie wojewódzkim* (ISiD Working Paper Nr 46). https://ssl-kolegia.sgh.waw.pl/pl/KAE/struktura/ISiD/publikacje/Documents /Working_Paper/ISID_WP_46_2015.pdf.

Panek, T. (2016). *Jakość życia – od koncepcji do pomiaru*. Warszawa: Oficyna Wydawnicza SGH.

Rogala, P. (2009). *Zaprojektowanie i przetestowanie systemu mierzenia jakości życia w gminach*. Jelenia Góra, Poznań: Uniwersytet Ekonomiczny we Wrocławiu, Wydział w Jeleniej Górze.

Savoia, E., Fantini, M. P., Pandolfi, P. P., Dallolio, L., & Collina, N. (2006). Assessing the construct validity of the Italian version of the EQ-5D: preliminary results from a cross-sectional study in North Italy. *Health and Quality of Life Outcomes*, *4*(47), 1–9. https://doi.org/10.1186/1477-7525 -4-47.

Sączewska-Piotrowska, A. (2015). Identyfikacja determinant bogactwa dochodowego z zastosowaniem modelu logitowego. *Zarządzanie i Finanse / Journal of Management and Finance*, *13*(4/2), 241–259. http://zif.wzr.pl/pim/2015_4_2_15.pdf.

Skąpska, E. (2015). Service sector as development engine of new countries in European Union. *Estudios en Ciencias Sociales y Administrativas de la Universidad de Celaya*, *5*(1), 51–64.

Skąpska, E. (2016). Services in Theory of Economic Order. Ordo perspective. In *Smart and Efficient Economy: Preparation for the Future Innovative Economy. 21th International Scientific Conference*. http://www.icem.lt/public/icem/ICEM_2016.pdf.

Słaby, T. (1990). Poziom życia i jakość życia. *Wiadomości Statystyczne*, *35*(6), 8–10.

Słaby, T. (2011). Współbieżność kryzysu i dobrostanu Polaków w czasie kryzysu. In M. Bombol (Ed.), *Jak żyć w kryzysie? Zachowania polskich konsumentów* (pp. 11–42). Warszawa: Oficyna Wydawnicza SGH.

Słaby, T. (2012). *Quality of life of the emerging upper class in Poland*. Warszawa: Oficyna Wydawnicza SGH.

Słaby, T. (2016). *The quality and dignity of life as the symptoms of social exclusion of aboriginal rural population added 60+ in Poland*. Warszawa: Oficyna Wydawnicza SGH.

Sompolska-Rzechuła, A. (2013). Pomiar i ocena jakości życia. *Wiadomości Statystyczne*, *58*(8), 19–36.

Sompolska-Rzechuła, A. (2017). Przestrzenne zróżnicowanie poziomu jakości życia w Polsce. *Wiadomości Statystyczne*, *62*(6), 38–57. https://doi.org/10.5604/01.3001.0014.0958.

Stanisz, A. (2006). *Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny: vol. 1. Statystyki podstawowe*. Kraków: StatSoft Polska.

Stanisz, A. (2007). *Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny: vol. 2. Modele liniowe i nieliniowe*. Kraków: StatSoft Polska.

Stanisz, A. (2016). *Modele regresji logistycznej: Zastosowanie w medycynie, naukach przyrodniczych i społecznych*. Kraków: StatSoft Polska.

Ståhl, E., Jansson, S.-A., Jonsson, A.-C., Svensson, K., Lundbäck, B., & Andersson, F. (2003). Health-related quality of life, utility, and productivity outcomes instruments: ease of completion by subjects with COPD. *Health and Quality of Life Outcomes*, *1*(18), 1–7. https://doi.org/10.1186/1477-7525-1-18.

Szukiełojć-Bieńkuńska, A., Włodarczyk, J., & Piasecki, T. (2014). Terytorialne zróżnicowanie wybranych aspektów jakości życia w Polsce. *Wiadomości Statystyczne*, *59*(8), 23–39.

Xing, Z., & Chu, L. (2012). Research on constructing composite index of objective well-being from China mainland. *Statistics in Transition new series, 13*(2), 419–438.

Zawadzka, A. M., & Górnik-Durose, M. (Ed.). (2010). *Życie w konsumpcji, konsumpcja w życiu: Psychologiczne ścieżki współzależności*. Sopot: Gdańskie Wydawnictwo Psychologiczne.