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Is it all about money? Consumption patterns hidden in energy divide: conclusions from research in Bytom and Katowice

Abstract: The main aim of this article is to present the results of research on energy poverty conducted in Katowice and Bytom, two cities situated in the Silesian *voivodeship* [region] in Poland. The study attempted to verify whether the energy divide concept elaborated by Bouzarovski and Tirado Herrero (2015) has different undiscovered dimensions which result not only from the differences in energy prices and incomes between various regions, but also from other factors such as consumer behaviours. In discussions about the energy divide, this aspect of energy poverty has so far been rather neglected. The question remains whether the distinction between energy poverty levels of countries, regions, and other territories like cities is determined by consumer behaviours or only by income and energy prices. Katowice and Bytom seem to be perfect places to conduct such. The most important conclusions emerging from the presented research are: (a) low income does not affect the behaviour of people suffering from energy poverty, even though it theoretically should; (b) despite their difficult financial situation, low-income households do little to improve their situation; and (c) public policy should take into account in the spatial distribution of households affected by energy poverty other aspects, including non-income and behavioural factors and patterns of persons affected by energy poverty, which only deepen existing social inequalities rather than reduce them.

Keywords: energy divide, fuel poverty, consumption, Katowice, Bytom

Czy chodzi tylko o pieniądze? Wzorce konsumpcji ukryte w podziale energetycznym: wnioski z badań w Bytomiu i Katowicach

Streszczenie: Głównym celem artykułu jest zaprezentowanie wyników badań poświęconych kwestii ubóstwa energetycznego w Katowicach i Bytomiu, dwóch miastach na prawach powiatu usytuowanych na terenie woj. śląskiego. Badania miały za zadanie dokonać weryfikacji tego, czy koncepcja podziału energetycznego autorstwa Bouzarovskiego oraz Tirado Herrero (2015) może zostać uzupełniona o inne wymiary, tj. wymiar konsumpcyjny, który mógłby uzupełnić pozostałe dwa, tj. wymiary związane z różnicami w cenach energii oraz z różnicami w dochodach pomiędzy poszczególnymi regionami. W dyskusji na temat podziału energetycznego, ten aspekt

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ubóstwa energetycznego był do tej pory raczej pomijany. Pytanie brzmi bowiem, czy zróżnicowanie geograficzne w poziomie ubóstwa energetycznego zależy wyłącznie od dochodu i cen energii, czy też od innych czynników. Katowice i Bytom wydają się doskonałym miejscem do prowadzenia tego typu badań. Najważniejsze konkluzje płynące z badań to: a) niski dochód nie wpływa na zachowanie osób dotkniętych ubóstwem energetycznym, mimo iż teoretycznie powinien; b) pomimo trudnej sytuacji finansowej, ubogie gospodarstwa domowe robią niewiele by poprawić ich sytuację; c) polityka publiczna powinna uwzględniać inne aspekty, takie jak zachowania konsumenckie członków gospodarstw domowych dotkniętych ubóstwem energetycznym, które jedynie pogłębiają problem, zamiast go redukować.

Słowa kluczowe: podział energetyczny, ubóstwo energetyczne, konsumpcja, Katowice, Bytom

Introduction

Winter is the time when one of the common issues raised in the media – particularly the British media – is the issue of fuel poverty. There are at least a few reasons for this state of affairs, including an increase in the number of deaths due to hypothermia, and an increase in the cases of different ailments such as respiratory disease, respiratory distress syndrome, asthma, and rheumatoid arthritis or inflammation (O’Sullivan et al. 2015). Living in energy poverty is a threat to both physical and mental health. Energy poverty can lead to social isolation in the short term (Healy and Clinch 2004) and depression in the long term as well. Moreover, children who struggle with lack of thermal comfort perform less well in school than other children, and their social and emotional development in later years is worse than their peers (Morrison and Shortt 2008).

There are relatively few papers that address the impact of energy poverty on the environment. There are many doubts around how improvements to energy efficiency benefit the environment. At least, such doubts emerge in the research carried out by Tirado Herrero and Urge-Vorsatz (2012). The opportunities offered by technological development in the fight against fuel poverty can have serious side effects. For example, investments made to improve the energy efficiency of buildings can lead not only to lower energy bills but also to an increase in spending on other consumer goods and services. Such an effect is called a rebound effect and means that the production of harmful substances is transferred from individual households to other sectors of the economy, especially to production. By looking at counteracting the negative effects of climate change, such a situation is difficult to accept, as the problem still exists but in a different guise (Tirado Herrero and Urge-Vorsatz 2012).

Fuel poverty was first introduced as a concept in the 1990s by Brenda Boardman in her book *Fuel poverty: from cold homes to affordable warmth* (Szamrej-Baran 2014). Since then, the concept has been subjected to severe criticism. Using the concept of fuel poverty, Boardman distinguished the energy situation of households in developed countries from the situation of households in developing countries. Boardman’s definition of fuel poverty presupposes that energy poverty occurs when expenditures on fuel exceed 10% of household income – previously the threshold was 12% (González-Eguino 2015). When expenditures exceed more than 20% of household income, households experience severe fuel poverty. The simplicity of this definition is often seen as its weakness. Firstly, the decision to choose a 10% threshold of household expenditures and its constancy over the last several years ra-

ises many doubts (Legendre and Ricci 2015). Secondly, taking into account different types of income, which can be used in measuring the scale of fuel poverty, the question about the legitimacy of the use of each of them appears as the type of income significantly affects the scale of fuel poverty (Moore 2012). Thirdly, a review of papers on fuel poverty reveals a different approach to the question of the expenditure on fuels. Some authors take into account only current expenditure on fuels, while others talk about the amount of hypothetical spending that the household should bear, taking into account its socio-demographic situation, building characteristics, and location (Walker et al. 2012). Looking a little closer at the problem of spending, one can come to the conclusion that the two approaches presented above are two sides of the same coin, provided that in the first case an attempt to identify the percentage of respondents who spend less than 10% of their household income on fuel do so at the expense of spending on other basic goods and services. At the same time, it is necessary to exclude those households who spend more than 10% of their household income on fuel only because their financial situation allows for this (Legendre and Ricci 2015). It can be done by combining both spending and income scale at the same time. In the United Kingdom, the criticism of Boardman's definition of fuel poverty took an even more extreme form resulting in the development of Low Income High Costs indicator (LIHC). As its name suggests, the LIHC indicator defines households struggling with the problem of energy poverty through the prism of not only their low income, but also the high costs of heating and using of other household devices, like appliances. Households experiencing fuel poverty are therefore those that have at their disposal less than 60% of their median equivalised income after deducting housing costs, and also bear energy costs above the median equivalised costs. Although the LIHC indicator was recently created in response to the drawbacks of other definitions of fuel poverty, it has already drawn criticism over setting the fuel poverty level at 60% of median household income, and for focussing only on equivalised energy costs without taking into account the energy efficiency of buildings inhabited by the households surveyed (Moore 2012).

Although the notion of fuel poverty was thought up in the UK, and research on fuel poverty is the most advanced there, in the rest of the European Union various analyses that focus on the scale of fuel poverty and also its historically and culturally determined characteristics are growing in numbers. The European Union seems to be a perfect area for research on fuel poverty, especially taking into account the fact that its institutions gather data necessary for modelling the scale of fuel poverty. As a result, these research made an attempt to capture the geographic specificity of fuel poverty in Europe. The concept of energy divide has been brought out into the open by the creation of a geographic line in Europe which separates areas that struggle more with the problem of energy service poverty from areas that struggle less:

The traditional division of EU states into three clusters is increasingly replaced by a relatively well-off "core" group of countries in Northern and Western Europe, and a heterogeneous "energy poverty periphery" in the South and East. In the former, domestic energy deprivation is limited to specific demographic and housing groups, while the latter exhibits a more pervasive presence of the problem across a range of social strata. Thus, the notion of the "energy divide" can be expanded from its original predominantly socially orientated

meaning (as described in *National Energy Action, 2014*) to encapsulate existing inequalities in access to infrastructure services at the scale of cities, regions and countries (Bouzarovski and Herrero 2015).

Research on fuel poverty focus primarily on three of its major determinants: income, fuel prices, and energy efficiency. From time to time the problem of fuel poverty is also investigated from the perspective of everyday behaviour of people who are affected by it. However, the consumer dimension of fuel poverty has been raised in discussions about the energy divide only to a small extent. That is why the aim of this article is to present the results of research conducted in Bytom and Katowice, two cities located in the Silesian voivodeship. Their choice was not accidental. It was assumed that differences in the level of unemployment, average salary, and the number of people benefiting from social assistance will be reflected in the scale of energy poverty in Bytom and Katowice. These differences would make it possible to compare the role and importance of other factors, including those related to consumption patterns. The concept of the energy divide would thereby be supplemented with a marginalized consumerist dimension.

The consumer dimension of energy poverty is more and more often visible not only in a scientific discourse, but also in official, governmental documents. One of such documents is the report prepared by the United Kingdom Department of Energy & Climate Change (DECC) entitled *Understanding the behaviours of households in fuel poverty*. The behaviours such as keeping lights on when it is needed, watching TV with the lights off or / and teaching children to turn-off lights when leaving a room are quite popular among households on a low income. However we should also take into account other elements such as heating systems used by the respondents or the methods of payments preferred by them (Barnes et al. 2014). Similar conclusions can be drawn from the research conducted in other countries (Stadtmüller 2014; Harmon et al. 2017).

1. Poland as a *matiere a penser*

The decision to choose Poland as a *matiere a penser* was dictated not only by the socio-economic diversity of the cities situated in its territory (even within generally affluent areas), but also by the fact that the problem of energy poverty is still very new in Poland and requires more detailed research. There is no statutory definition of fuel poverty in Poland. There is only the notion of the vulnerable electricity customer who is entitled to receive energy benefits. Such vulnerable electricity customers receive a housing benefit as a party of a comprehensive agreement or power purchase agreement, and reside at the place of electricity supply. The flat-rate energy benefit for single households during the period of 1st May 2016 to 30th April 2017 was 11,29 zł per month; for households consisting of two to four people, the benefit was 15,68 zł per month; and for households consisting of at least five persons, the benefit was 8,81 zł monthly. The energy benefit cannot exceed 30% of the product of the limit of energy consumption and the average electricity price for the electricity consumer. The electricity consumption limit is 900 kWh per calendar year for a single household, 1250 kWh per calendar year for a household consisting of two to four people,

and 1500 kWh in a calendar year for a household consisting of at least five persons (<http://www.ops.chrzanow.pl/dodatek-energetyczny>).

The research on fuel poverty on a whole-country perspective and for individual regions in Poland is still not abundant. The most important institution which conducts such research in Poland is without a doubt the Institute for Structural Research in Warsaw. The Institute estimates the scale of fuel poverty and identifies its main determinants on the basis of data collected at the central level by state institutions, such as the Central Statistical Office. However, there are still not many studies that focus on the local dimension of fuel poverty, and concentrate on aspects other than the quality of the housing stock, income received by households, and energy prices in Poland. Aspects like the daily behaviour of those affected by fuel poverty-which can only deepen the problem-are rather neglected in the research conducted by the Institute for Structural Research. Other aspects include the impact of fuel poverty on physical and mental health, and social participation (e.g., social exclusion).

A huge merit of the Institute is that the calculations done by its researchers are an excellent starting point for further analysis conducted at the level of municipalities, counties, and regions on the aforementioned aspects of energy poverty that until now have not been investigated enough. From the point of view of the energy divide, the conclusions flowing from the reports published by the Institute this year are especially interesting. These conclusions help to understand the characteristics of the energy divide in Poland through the prism of factors such as income, energy prices, and energy efficiency. The aim of this paper is not to discuss the results of the research carried out by the Institute, since they are available online, but to pay attention to the conclusions coming from them. In particular:

The regional variation of fuel poverty in Poland is significant in both dimensions: energy affordability (LIHC measure) and lack of thermal comfort (subjective measure). At the same time, strong presence of one dimension coincides with low intensity of the other (...) The energy affordability dimension of fuel poverty is mostly related to income and living area, whereas lack of thermal comfort to energy efficiency. Energy efficiency of buildings and household income are highly related to the degree of urbanisation. Large detached houses predominate in rural areas, while blocks of flats (with usually smaller floor area) in urban areas. Income is also higher in cities. The consequence of this spatial sorting is the concentration of troubles in energy affordability in rural areas and lack of thermal comfort in cities. Therefore, the instruments that aim to eradicate the affordability dimension of fuel poverty should focus on income inequalities, and energy efficiency of detached houses. In order to elevate the thermal comfort, in turn, it is crucial to improve the energy efficiency of old blocks of flats in cities. Characteristics of buildings, characteristics of households and the degree of urbanisation together explain the majority of the variation of energy affordability dimension (LIHC measure) of fuel poverty. Lack of thermal comfort (subjective measure) is a more complex phenomenon, and it is more difficult to capture by aggregate variables (...) The component of regional variation in the lack of thermal comfort, that cannot be explained by characteristics of buildings and households, is related to the differences in prices of central heating and average temperatures (Lis et al. 2016a).

It is worth noting that the Institute for Structural Research recognises these weaknesses of their research. Therefore, it should be surprising that they consider other methods and

techniques of measuring the fuel poverty in Poland just as important as the LIHC measure. A response to this are the results of which are presented in this article, which concern not only the local dimension of energy poverty, but also unexplored aspects of the energy divide:

The diversity of the fuel poor justifies the need for the multidimensional approach. The LIHC measure is not sufficient to identify the whole spectrum of households matching the definition of “experiencing difficulties in meeting basic energy needs at their place of residence”. (...) A broad approach to measurement of fuel poverty allows to better design the policies aimed at eradicating the problem (Lis et al. 2016b).

2. Research methodology

As with all studies, the starting point was to define research hypotheses which in the case of this article are as follows: respondents living in Bytom are lacked of money on energy bills (electricity, gas, coal etc.) and spend more energy on heating their dwellings more often than respondents from Katowice. They assess the level of their energy bills as too high and are forced to limit spending in other areas of life in order to pay energy bills. They use prepayment methods more often than the respondents living in Katowice. Moreover their dwellings are in worse condition than those of the respondents from Katowice.

In contrast respondents living in Katowice save energy using energy-efficient appliances/electronics, use energy efficient systems to heat their dwellings as well as are willing to change their energy supplier more often than respondents from Bytom.

Purposive sampling, which is a type of non-probability sampling techniques, was used in order to guarantee that each of age categories will be represented by the same number of respondents. Such an operation was aimed at ensuring typological representativeness of the results obtained. The age of respondents was chosen as it is one of the factors that determines the risk of living in energy poverty. Over-representation of any of these groups could lead to the distortion of the results. Interviewers were instructed on how to reach a specific group of respondents and so 248 persons who took part in the research completed the questionnaire of 20 single and multiple-choice questions and 13 demographic questions (see annex). Because of this the statistical significance of the results presented in the paper only applies to the sample and not to the entire population of Katowice and Bytom (tab. 1).

TABLE 1. Respondents' age category

TABELA 1. Wiek respondentów

	18–25	26–35	36–45	46–55	56–65	> 65	Total
Bytom	20	20	20	20	22	20	122
Katowice	21	22	21	20	22	20	126
Total	41	42	41	40	44	40	248

More than half of respondents were women in either case. There were more respondents with basic vocational and upper secondary education and less with higher education in By-

tom than in Katowice. There were also less single individuals and more widows/widowers and married individuals from Bytom.

In the case of Bytom, 50% of the households consisted of two adults, 21% were households with three adults, and 16% were single-person households. Most of them were households without children. Twenty percent of households had one child, and 7% had two children. In the case of Katowice, 39% of the households consisted of two adults, 30% were households with three adults, and 18% were households with four adults. Only 10% of respondents were from single-person households. Most of them were households without children (56%). Twenty-seven percent of households had one child, and 13% had two children.

There were more participants from households where the average per capita monthly income ranged from 501–1500 zł in Bytom (67%) than in Katowice (35%). This indicates that the financial situation of the households located in Bytom were worse than those households situated in Katowice. There were roughly equal numbers of participants from households whose income ranged from 501–1000 zł and from 1001–1500 zł in Bytom, and whose income ranged from 1501–2000 zł and above 2000 zł in Katowice.

The respondents were also classified according to the economic activity of their households. 35% of all households in Bytom and 67% of households in Katowice were non-retired working households without an unemployed person. 35% of those surveyed in Bytom also lived in non-retired working households with at least one unemployed person. In Katowice there were only 8% of such households. 20% of households in Bytom and 16% of households in Katowice were non-working pensioner households. The percentage of working pensioner households was 7% in Bytom and 8% in Katowice. Only 3% of respondents in Bytom and only 1% in Katowice described their households as non-retired unemployed households. Of all the households surveyed, only 13.1% used social benefits in either case and 4% took advantage of energy benefits in Bytom and none of surveyed households in Katowice. Results are shown in Table 2.

TABLE 2. Type of household according to professional activity [%]

TABELA 2. Rodzaj gospodarstwa domowego ze względu na aktywność zawodową [%]

	Retired	Working without unemployed person	Working with unemployed person	Unemployed	Total
Bytom (N = 122)	27	35	35	3	100
Katowice (N = 123)	24	67	8	1	100

More than half of the respondents from Bytom resided in buildings built between 1945 and 1979, while 40% lived in more modern buildings built between 1980 and 1989. The situation of the respondents from Katowice was different. More than half of them lived in buildings built between 1980 and 1989, and the same percentage lived in buildings built between 1945 and 1979 and after 1990 (22%).

Multi-family home ownership was common among respondents in both Bytom (68%) and in Katowice (65%), followed by multi-family renting (17%) and single-family home ownership (15%) in Bytom and by single-family home (23%) and multi-family renting (11%) in Katowice.

The respondents from Katowice more often assessed the standard of their dwelling as high than the respondents in Bytom. They also less often assessed the standard of their dwelling as average. Results are shown in Table 3.

TABLE 3. The standard of respondents' dwellings [%]

TABELA 3. Standard zamieszkiwanego budynku [%]

	High	Average	Low	Hard to say	Total
Bytom (N = 121)	22	69	3	5	100
Katowice (N = 127)	33	47	4	16	100

Despite the higher standard of living and better financial situation, the surveyed participants from Katowice were not as satisfied with their health condition as the surveyed participants from Bytom. They more often declared they had problems with health than the respondents from Bytom. These results are surprising, considering it is the impact of domestic energy deprivation on household health that has led to the rise in popularity of the concept of energy poverty. Further explanation of these results will require additional research, but it can be noted here that any assessment of one's own health is a subjective measure and is likely to be largely aspirational in nature. Moreover, people affected by energy poverty are far less likely to benefit from the regular attention of medical experts, and as such are less likely to have access to reliable information about the actual state of their health.

3. Results and discussion

The average monthly net income per household member was compared with monthly average expenses on energy, which indicated that 62.9% of respondents from Bytom and 55.3% of respondents from Katowice lived in fuel poverty, if the 10% definition of fuel poverty was adopted, and using actual rather than required expenditure. The most probable level of fuel poverty was 29.1% in Bytom and 12.2% in Katowice, as the respondents who earn from zero to 1000 zł are the most vulnerable people. A more pessimistic scenario assumes that 44.7% of those who took part in the survey in Bytom and 23% of those who took part in the survey in Katowice who earn from 0 to 1500 zł. could live in fuel poverty. See Table 4 and Table 5 for further results.

The use of both the income scale and the 10% definition of fuel poverty is a good way to identify those who are the most vulnerable part of the research population when it comes of the risk of living in fuel poverty. As was already mentioned, some households are wealthy enough to be able to comfortably pay higher energy bills than others. In both cases, such households may be represented by the last two income classes, i.e., those households with an average per capita monthly income over 1501 zł.

The first difference between respondents from Bytom and Katowice in relation to their daily behaviour and habits concerned turning off lights in empty rooms. Leaving the lights turned on results in an increase in electricity bills. Greater awareness of this seems to be

TABLE 4. Energy poverty level in Bytom

TABELA 4. Poziom ubóstwa energetycznego w Bytomiu

			Average monthly spending on energy					Total
			below 50 zł	from 51 to 100 zł	from 101 to 200 zł	from 201 to 300 zł	> 301 zł	
Average monthly net income per member	from 501 to 1000 zł	% of average monthly net income per member	0	13.8	44.8	41.4	0	100
		% of total	0	4.7	15.1	14	0	33.7
	from 1001 to 1500 zł	% of average monthly net income per member	0	20.7	34.5	31	13.8	100
		% of total	0	7	11.6	10.5	4.7	33.7
	from 1501 to 2000 zł	% of average monthly net income per member	0	0	38.5	53.8	7.7	100
		% of total	0	0	5.8	8.1	1.2	15.1
	over 2000 zł	% of average monthly net income per member	6.7	6.7	33.3	33.3	20	100
		% of total	1.2	1.2	5.8	5.8	3.5	17.4

% of households in fuel poverty in Bytom = 62,9% the result was obtained by adding all values in bold which show the households that spend on energy more than 10% of their income (10% definition of fuel poverty, N = 86).

TABLE 5. Energy poverty level in Katowice

TABELA 5. Poziom ubóstwa energetycznego w Katowicach

			Average monthly spending on energy					Total
			below 50 zł	from 51 to 100 zł	from 101 to 200 zł	from 201 to 300 zł	> 301 zł	
Average monthly net income per member	from 0 to 500 zł	% of average monthly net income per member	0	0	100	0	0	100
		% of total	0	0	1.5	0	0	1.5
	from 501 to 1000 zł	% of average monthly net income per member	0	22.2	55.6	11.1	11.1	100
		% of total	0	3.1	7.7	1.5	1.5	13.8
	from 1001 to 1500 zł	% of average monthly net income per member	0	14.3	35.7	35.7	14.3	100
		% of total	0	3.1	7.7	7.7	3.1	21,5
	from 1501 to 2000 zł	% of average monthly net income per member	0	25	35	10	30	100
		% of total	0	7.7	10.8	3.1	9.2	30.8
	over 2000 zł	% of average monthly net income per member	4.8	0	33.3	47.6	14.3	100
		% of total	1.5	0	10.8	15.4	4.6	32.3

% of households in fuel poverty in Katowice = 5,3% the result was obtained by adding all values in bold which show the households that spend on energy more than 10% of their income (10% definition of fuel poverty, N = 65).

shown in the respondents living in Katowice, where the vast majority of them turned off the lights when they left a room. In the case of Bytom, such respondents were slightly more than half. The difference between the answers given by respondents from Katowice and Bytom was 26%. Results are shown in Table 6.

TABLE 6. Consumption divide – turning off lights [%]

TABELA 6. Podział konsumpcyjny – wyłączanie świateł [%]

	No	Yes	Total
Bytom (N = 112)	43	57	100
Katowice (N = 127)	17	83	100

Note. $X^2 = 18,736$; $p = 0$; $df = 1$; $V = 0,28$.

The second difference between respondents from Bytom and Katowice in relation to their daily behaviour and habits concerned using chargers, particularly cell phone chargers. While more than half of the respondents from Katowice unplugged the chargers from a power supply when charging was complete, such a behaviour was observed only in a very small percentage of respondents from Bytom. Contrary to popular belief, leaving the charger connected to a power supply means that the current is still active, and therefore electricity bills continue to rise. The difference between the answers given by respondents from Katowice and from Bytom was 44%. Results are shown in Table 7.

TABLE 7. Consumption divide – unplugging chargers [%]

TABELA 7. Podział konsumpcyjny – odłączanie ładowarek [%]

	No	Yes	Total
Bytom (N = 112)	85	15	100
Katowice (N = 127)	41	59	100

Note. $X^2 = 48,393$; $p = 0$; $df = 1$; $V = 0,45$.

The third difference between respondents from Bytom and Katowice in relation to their daily behaviour and habits concerned using power strips as a way to make some albeit small savings. Research showed that none of the respondents living in Bytom used this kind of technical solution. In the case of the respondents from Katowice, one in five admitted to using power strips in their dwellings. As shown in Table 13, this solution does not enjoy much popularity in either case. The difference between the answers given by respondents from Katowice and from Bytom was 20%. Results are shown in Table 8.

The same can be said about the fourth difference between everyday behaviour of the respondents from Katowice and Bytom, although this time the percentage of the respondents from Bytom who ran the washing machine or dishwasher only when full was 10%, while the percentage of the respondents from Katowice was 25%. The frequency of using such devices significantly affects the amount of energy bills. Despite this, as the results of the

TABLE 8. Consumption divide – using power strips [%]

TABELA 8. Podział konsumpcyjny – używanie list energooszczędnych [%]

	No	Yes	Total
Bytom (N = 112)	100	0	100
Katowice (N = 127)	80	20	100

Note. $X^2 = 25,728$; $p = 0$; $df = 1$; $V = 0,328$.

research show in Table 9, knowledge about the ways in which one can reduce the costs of their use is still insufficient.

TABLE 9. Consumption divide – running the washing machines, when is full [%]

TABELA 9. Podział konsumpcyjny – korzystanie z pralki, dopiero kiedy jest pełna [%]

	No	Yes	Total
Bytom (N = 112)	90	10	100
Katowice (N = 127)	75	25	100

Note. $X^2 = 9,536$; $p = 0,002$; $df = 1$; $V = 0,2$.

It is also worth mentioning the different attitude of the respondents from Katowice and Bytom to energy-saving bulbs used in their dwellings. The vast majority of those surveyed from Bytom did not use energy-saving bulbs, while less than half of those surveyed from Katowice used these bulbs. The difference between the answers given by respondents from Katowice and from Bytom was 37%. Results are shown in Table 10.

TABLE 10. Consumption divide – using energy-saving bulbs [%]

TABELA 10. Podział konsumpcyjny – korzystanie z energooszczędnych żarówek [%]

	No	Yes	Total
Bytom (N = 112)	80	20	100
Katowice (N = 127)	43	57	100

Note. $X^2 = 35,578$; $p = 0$; $df = 1$; $V = 0,386$.

One of the factors that determines whether a household is at risk of fuel poverty is the way the energy bills are paid. As previous research has shown, pre-payment significantly increases the chance of living in fuel poverty. This also seems to be confirmed by the results of the research conducted in Bytom and Katowice. In Bytom, where the scale of energy poverty is higher than in Katowice, more respondents rely on pre-payment than in Katowice. It is particularly visible in cases of electronic transfer payments. Results are shown in Table 11.

TABLE 11. Consumption divide – pre-payment – electronic transfer [%]

TABELA 11. Podział konsumpcyjny – płatność z góry – przelewem [%]

	No	Yes	Total
Bytom (N = 118)	71	29	100
Katowice (N = 125)	96	4	100

Note. $X^2 = 27,738$; $p = 0$; $df = 1$; $V = 0,338$.

One of the possible ways to improve the situations of households living in energy poverty is to encourage members to switch energy suppliers so they can take advantage of energy tariffs that are more favourable to them. Two questions were posed to the respondents from Bytom and Katowice that concerned switching energy suppliers. The first one referred to their willingness to change energy suppliers. More respondents from Bytom were willing to switch energy suppliers than those from Katowice. The second question surveyed participants' consideration of changing energy suppliers. There were more respondents from Katowice who considered this than in Bytom (See Table 12 and Table 13). The results of this research proved that the willingness to change energy suppliers did not necessarily mean that the surveyed participants took any action to make such a change possible.

TABLE 12. Consumption divide – switching energy suppliers [%]

TABELA 12. Podział konsumpcyjny – zmiana dostawcy energii [%]

	Would you be willing to switch energy suppliers?			Total
	No	Yes	Hard to say	
Bytom (N = 121)	10	40	50	100
Katowice (N = 127)	52	23	26	100

Note. $X^2 = 56,215$; $p = 0$; $df = 4$; $V = 0,476$.

TABLE 13. Consumption divide – switching energy suppliers [%]

TABELA 13. Podział konsumpcyjny – zmiana dostawcy energii [%]

	Did you consider switching energy suppliers?		Total
	No	Yes	
Bytom (N = 121)	93	7	100
Katowice (N = 127)	86	14	100

Note. $X^2 = 3,775$; $p = 0,052$; $df = 1$; $V = 0,123$.

In the case of other behaviours for example turning off the devices that are not in use, buying energy-efficient appliances/electronics, renovating home/apartment to reduce the heat loss as well as in the case of other forms of payment for energy only the correlations without the statistical significance were observed (see annex).

4. Conclusions and policy implications

Until now, the energy divide concept has been based only on income and energy prices. The differences in incomes are closely linked to the differences in the quality of housing. The buildings inhabited by more affluent households achieve better energy efficiency classes than the buildings occupied by households with low incomes. Income seems to be the most important factor deciding whether a household is living in fuel poverty or not. With the appropriate income, a household is able to cope with rising energy prices and can invest in improving the energy efficiency of the occupied property.

As it is clear from the described research, low income does not affect the behaviour of people suffering from fuel poverty, even though it theoretically should. Although the financial situation of the households living in poverty should be a motivation to adopt an active attitude, it can also be a barrier. The reality in which such households live is so absorbing that it prevents members of these types of households to seek effective ways to improve the energy situation of their households; they may simply be discouraged to do it. That is why the geographic dimension of the behaviours of members of the households living in fuel poverty gives the energy divide understood as an analytical concept new opportunities. From the point of view of public policy, it means the need to take into account not only income and energy prices, but also daily behaviour patterns of persons affected by fuel poverty which only deepen existing social inequalities rather than reduce them. From this fact, a proposal concerning the character of future fuel poverty policy in Poland can be drawn. Such a policy needs a definition of energy poverty to be adopted, and regions particularly affected by energy poverty such as Bytom to be identified using such a definition. Alleviating energy poverty is not only about changing income, energy prices, and energy efficiency; it is also about influencing consumption patterns. All of them are geographically rooted just as energy poverty is.

The results of the research undoubtedly encourage us to ask further questions about the specificity of the problem of energy poverty in cities such as Katowice and Bytom. The analysis of differences in behaviours and habits should be enriched with questions about motivation that guide consumers in their everyday decisions. In the case of the members of low-income households the attention should be paid to their ability to think about the energy situation of their household and improvements needed taking into account their limited time and possibilities.

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Annex

The University of Silesia in Katowice (Poland) is carrying out a survey to find out about the problem on fuel poverty in the United Kingdom and the actions taken in this field by the British government and non-governmental organisations. The findings from the survey will be used to prepare a book on fuel poverty in the United Kingdom thanks to which authors of the publication plan to increase the awareness of the problem of fuel poverty in Europe among Polish policy makers so they could improve the condition of Polish citizens who are at the risk of fuel poverty. Taking part in the survey is totally anonymous and confidential. You cannot be identified in any way.

1. Have you ever encountered the situation where you were lacked of money on energy bills (electricity, gas, coal etc.)?	
1.1. It happens to me all the time	
1.2. It happens to me quite often	
1.3. It happens to me from time to time	
1.4. It happened to me so far only once	
1.5. It never happened to me	

2. How much energy do you use to heat your apartment / house?	
2.1. I consume too much energy	
2.2. I use as much energy as I need	
2.3. I consume not enough energy	
2.4. Hard to say	

3. How do you assess the level of your energy bills (electricity, gas, coal etc.)?	
3.1. Too high	
3.2. Too low	
3.3. Adequate to the consumption	
3.4. Hard to say	

4. How do you save energy? <i>Multiple-choice question</i>	
4.1. I turn off the lights in the empty rooms	
4.2. I turn off the devices I don't use	
4.3. I don't leave my chargers plugged in with no device attached	
4.4. I use power strips	
4.5. I buy energy-efficient appliances and electronics	

4.6. I run the washing machine, dishwasher only when they are full	
4.7. I use energy-saving light bulbs	
4.8. I renovate my apartment/house to reduce heat loss	
4.9. In a different way	
4.10. I don't save energy	

5. How often do you limit spending in other areas of life in order to pay energy bills?	
5.1. Very often	
5.2. Often	
5.3. Rarely	
5.4. Never – go to the question 7	

6. You save the money in order to pay energy bills on: <i>Multiple-choice question</i>	
6.1. Food	
6.2. Clothing	
6.3. Chemicals, cleaning agents	
6.4. Cosmetics	
6.5. Going to cinema, theatre, restaurants etc.	
6.6. Renovation of your apartment or house	
6.7. Other expenses	

7. How do you heat your apartment/house? <i>Multiple-choice question</i>	
7.1. Electric heating	
7.2. Gas heating	
7.3. Oil heating	
7.4. Carbon heating	
7.5. Wood heating	

7.6. Other, please explain	
7.7. Don't know	

8. Which methods of payment of electricity bills do you use?	
8.1. Payment order after receipt of invoice	
8.2. Traditional bank transfer after receipt of invoice	
8.3. Electronic bank transfer after receipt of invoice	
8.4. Cash payment after receipt of invoice	
8.5. Traditional bank transfer as prepayment (ie. pre-paid)	
8.6. Electronic bank transfer as prepayment (ie. pre-paid)	
8.7. Cash payment as prepayment (ie. pre-paid)	
8.8. In a different way	

9. Why do you make a payment in this way?	
9.1. For reasons of convenience	
9.2. For security reasons	
9.3. Due to the ability to control the amount of energy consumption	
9.4. For other reasons, please explain	

10. Do you fall behind on your payments (electricity, gas, coal, etc.)? <i>Multiple-choice question</i>	
10.1. I fall behind on payments for electricity	
10.2. I fall behind on payments for gas	
10.3. I fall behind on payments for coal	
10.4. I fall behind on payments for gas	
10.5. I fall behind on payments for wood	
10.6. No, I don't – go to the question 16	

11. What are the main reasons for this? <i>Multiple-choice question</i>	
11.1. I forgot to pay the electricity bill – go to the question 13	
11.2. I pay only when I have no choice – go to the question 13	
11.3. I was surprised by the last bill – go to the question 13	

11.4. Incomes of my household are too low – go to the question 13	
11.5. Incomes of my household have been reduced – go to the question 12	
11.6. Other reasons	

12. What are the reasons for this? <i>Multiple-choice question</i>	
12.1. My own disease or disease of my relative	
12.2. Death of my relative	
12.3. Divorce or separation	
12.4. Loss of a job	
12.5. Other reasons	

13. How long do you fall behind on your payments?	
13.1. Less than 1 month	
13.2. From 1 to 2 months	
13.3. From 2 to 6 months	
13.4. From 6 to 12 months	
13.5. Over 1 year	
13.6. Hard to say	

14. How high are your arrears?	
14.1. Less than 50 zł	
14.2. From 50 to 100 zł	
14.3. From 101 to 200 zł	
14.4. From 201 to 300 zł	
14.5. More than 300 zł	

15. How do you assess the fact that you fall behind on your payments?	
15.1. It is a very big problem for me	
15.2. It is a rather big problem for me	
15.3. It is a rather small problem for me	
15.4. It is a very small problem for me	
15.5. This is not a problem for me	

16. Would you be willing to change your energy supplier?	
16.1. Definitely yes	
16.2. Rather yes	

16.3. Probably not	
16.4. Definitely not	
16.5. Hard to say	

17. Have you ever considered changing your energy supplier?	
17.1. Yes	
17.2. No	

18. How do you assess the standard of your apartment / house?	
18.1. As a very high	
18.2. As a rather high	
18.3. As a medium	
18.4. As a rather low	
18.5. As a very low	
18.6. Hard to say	

19. Does your apartment / house require the following measures of modernisation / renovation? <i>Multiple-choice question</i>	
19.1. Replacement / repair of the roof	
19.2. Replacing leaking windows	
19.3. Isolation of the walls	
19.4. Replacement of the heaters	
19.5. Dehumidification	
19.6. Other, please explain	
19.7. None of the above	

20. How do you assess the health situation of your household?	
20.1. Very good	
20.2. Rather good	
20.3. Satisfactory	
20.4. Bad	
20.5. Very bad	
20.6. Hard to say	

21. Sex	
21.1. F	
21.2. M	

22. Age	
22.1. 18–25	
22.2. 26–35 years	
22.3. 36–45 years	
22.4. 46–55 years	
22.5. 56–65 years	
22.6. Over 65 years	

23. Marital status	
23.1. Single	
23.2. Divorced, divorcee	
23.3. Widower, widow	
23.4. Married	
23.5. Separation	

24. Education	
24.1. Higher school or lower	
24.2. National Vocational Qualification	
24.3. Secondary education	
24.4. Higher education	

25. The average monthly income per household member	
25.1. Up to 500 zł	
25.2. From 501–1000 zł	
25.3. From 1001 to 1500 zł	
25.4. From 1501 to 2000 zł	
25.5. Over 2000 zł	

26. Average monthly bills on energy (TOTAL expenses for electricity, gas, coal etc.).	
26.1. Up to 50 zł	
26.2. From 51 to 100 zł	
26.3. From 101 to 200 zł	
26.4. From 201 to 300 zł	
26.5. From 301 to 400 zł	
26.6. From 401 to 500 zł	
26.7. From 501 to 600 zł	
26.8. Over 600 zł	

27. The number of household members	
27.1. Adults	
27.2. Dependent children	

28. Do among the members of your household is a person with a disability?	
28.1. Yes	
28.2. No	

29. Does any of the members of your household receive social benefit?	
29.1. Yes	
29.2. No	
29.3. Don't know	

30. Building construction date	
30.1. Before 1945	
30.2. 1945–1979	
30.3. 1980–1989	
30.4. After 1990	

31. Type of building	
31.1. Single family – ownership	
31.2. Single family – renting	
31.3. Multi-family – ownership	
31.4. Multi-family – renting	

32. Bytom or Katowice	
.....	