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RURAL HOUSEHOLDS AS FOOD PROSUMERS IN THE CONTEXT OF SUSTAINABLE CONSUMPTION – AN EXAMPLE OF POLAND

Abstract

A consumer can choose between shopping on the market of goods and services and prosumption, producing such goods themselves. Prosumption is the most efficient method of satisfying the needs of household members, allowing to minimize costs and ensuring the level of fulfillment of needs. The aim of the article is evaluation of the level of self-supply of food in rural households in Poland, which is in line with new consumer trends, being part of sustainable development, including sustainable food production and consumption. For that purpose, an index of food self-supply was developed based on statements of respondents concerning the level of production and consumption of selected food products indicated in the survey, produced for one's own use. Next, relationship were analyzed between the level of food self-supply and variables describing sociodemographic characteristics of the surveyed households. The level of food self-supply in low-income households was significantly higher than in medium – and high-income households. The number of persons in a household does not affect its level of food self-supply. Households with children up to 14 years of age are characterized by a higher level of food self-consumption. The analysis shows that the highest level of food self-sufficiency is characteristic of type 1 households, lower – type 2, and the lowest – type 3 households.

Keywords: *Rural households, food self-supply, food prosumption, sustainable consumption, Poland*

Introduction

The world of consumption is continuously changing, and consumer behaviour is one of the most significant forms of human behaviour (Helgeson et al., 1984; Trivedi, 2011). It is defined, among others, as all actions related to procuring and using products and services, and disposing of them, together with decisions preceding and conditioning such actions (Solomon et al., 1999; Schiffman & Kanuk, 1995). In reaction to excessive consumerism, tendencies are emerging in behaviour of modern consumers (Mróz, 2010; Figiel & Kufel, 2016; Santos Millán, 2019; Jackson, 2005). The growing education level of consumers and the promotion of behaviours of sustainable and conscious consumption lead to more and more people expressing the willingness and determination to introduce changes in their everyday lives in order to prevent excessive degradation of the environment and to decrease the negative impact of humans on the environment (ecological footprint) (Torjusen et al., 2001; Wandel & Bugge, 1997). However, unconceivably, humans are notoriously destroying the planet by exploiting natural resources, killing animals, wiping out rain forests, polluting oceans and rivers (Aytaç, 2021).

The aim of the study is evaluation of prosumer behaviours of rural households, related to production of food for their own purposes.

The novelty of these studies is the construction of a synthetic index defining the level of food prosumption for the surveyed households based on the level of food self-supply of selected food products.

The research question posed in the study concerns the impact of sociological variables describing the surveyed households on the level of food self-supply (income, number of people in a household, number of children in a household, type of household according to the relationship with agriculture).

Literature review

Environmentally conscious consumer behaviour refers to the extent to which a consumer takes rational and reasonable actions in order to protect the natural environment (Zabkar & Hosta, 2013). In mainstream analyses of sustainable development, the problem of the natural environment is the object of interest for scientists and businesses, as well as consumers (Magnusson et al., 2003). At present, it is considered a megatrend, in the future, it should become gigatrend. Noticing those problems becomes a stimulus to introduce changes in the management of resources, which is reflected in a shift towards a model of sustainable consumption, within the framework of which one uses consumption goods prudently (Hines, 2008).

An important part of the concept of sustainable consumption is sustainable and rational consumption of food. Food consumption is a special area of consumption since, apart from its fundamental nature, it expresses the latest tendencies in consumer behaviour, resulting from civilization progress. There is a growing interest in food products with natural qualities. An important phenomenon is also the increasing interest in consumption of natural and ecological food due to its qualities related to pro-social aspects (Schifferstein & Oude Ophuis, 1998).

According to Toffler (1980), prosumption is any activity within the scope of which people take various actions in order to produce goods which satisfy their needs. Jung defines prosumption as a phenomenon of intertwining processes of consumption and production, until the lines between them become blurred (Jung, 1997). Xie, Bagozzi and Troye (2008) define prosumption as a process of performance by the consumer of activities which create value, lead to manufacturing of products, while simultaneously increasing the consumer experience, thus relating to the concept of co-creation of values together with the consumer.

At present, prosumption is understood in a much broader way. It is described as intelligent consumption. On the one hand, it becomes more and more present in the modern literature, and on the other hand – it encompasses a much broader set of various forms of activities of purchasers. In literature, numerous interpretations and definitions of prosumption can be found, depending on the development of the strongly correlated concepts of relationship

marketing, service-dominant logic of marketing, and collaborative marketing, as established so far (Claffey & Brady, 2014; Campbell, 2005; Battistella & Nonino, 2012; Fuchs & Schreier, 2011).

The development of prosumption is a consequence of progress in education, a change in work organization due to the disappearance of the traditional division into work time and free time, more free time available, and the need of organizing that time attractively. Undoubtedly, a factor affecting the development of prosumption in recent years has been the economic crisis, which is forcing consumers to become more active, make products on their own, or limit the use of services by performing them themselves. In such a case, this form of prosumption is related to natural consumption and independent production of goods. The development of prosumption is also influenced by the virtualization of life and easier access to new technologies, such as the Internet or mobile phones (Szul, 2013; Ritzer & Jurgenson, 2010).

Materials and methods

The research material used in the present study was own survey conducted in 2017, covering the population of 302 households located in rural areas of the mazowieckie province in Poland. The research was conducted using the method of diagnostic poll, the survey technique, with its tool being the survey questionnaire. The object of the research was rural households, that is households with a permanent place of residence located in the countryside. The households can be divided into: rural households being typical agricultural households (type 1), agricultural and employee households (type 2), rural households not related to agriculture (type 3). Type 1 households are those whose main source of income is the farm. Type 2 households live off both full-time employment and derive their income from the farm. Type 3 households do not have a farm, the main source of income is full-time employment.

Rural households were selected for the research on purpose, since they constitute over 40% of the total number of Polish households, and according to censuses conducted so far and forecasts of the Central Statistical Office, their number will keep growing (Statistics Poland, 2014; Statistics Poland,

2017). Migration to the countryside is a new social phenomenon, consumers increasingly appreciate peace, quiet and nature.

The level and structure of self-supply of food and services in rural households depends on simultaneous operation of multiple factors. In order to meet the research objective and fulfill the tasks presented in the article, the researchers had to apply several measures and statistical methods: ANOVA (variance analysis), a chi-squared test, and a two-sample location Student's t-test. The value of the materiality level assumed in the research was $p<0.05$. The statistical analysis was performed using the Excel program.

59% of the participants were women, while 41% were men . The most numerous age group were persons in the age range of 45-54 (29%). The households being the object of the research consisted mainly of two – and three-generation families, predominantly with four family members (29%). Approximately 32% of the surveyed units are households with children under 14. The major group among respondents were individuals with the monthly income per 1 person in the range of 501.00-1000.00 PLN (28.8%). In the structure of the surveyed rural households, there were 51.7% of typical agricultural households (type 1), 32.8% of agricultural and employee households (type 2), and 15.6% of households not related to agriculture (type 3).

In order to evaluate the level of self-supply of food in rural households and to determine the factors having an impact on such consumer behaviour, the following steps were taken. The first step was the development of an index of food self-supply based on respondents' replies concerning the level of production and consumption of selected food products indicated in the survey. The answers of respondents who had more than 50% of missing data in response to the question about the level of self-supply by category of food products (table 1) were removed from the analysis. Then the remaining missing data were imputated using the mean for each respondent.

Next, index properties were analysed. The third step was to check for relationship between food self-supply and variables describing sociodemographic characteristics of households.

Results and discussion

In the first place, an index of food self-supply was developed based on replies to the question asked in the survey, as indicated in table 1. The respondents declared the level of self-supply of food in their households expressed as a percentage in ranges provided in the survey for individual categories of food products. All replies were re-coded on the scale of 0 – 5 (none = 0; 1-20% = 1; 21-40% = 2; 41-60% = 3; 61-80% = 4; 81 – 100% = 5).

Table 1. The level of self-supply by category of food products.

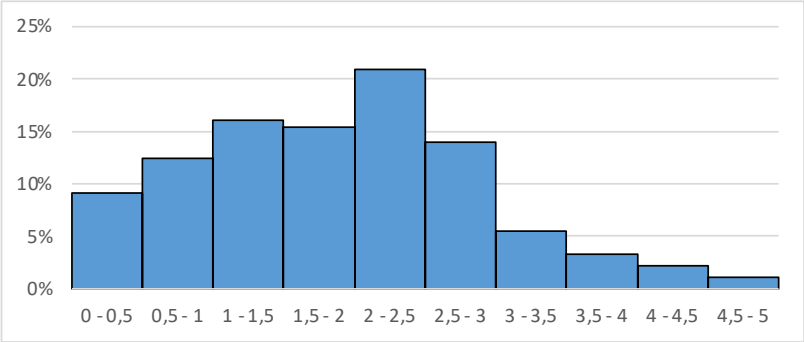
Types of products/ the level of consumption	At all	1–20%	21–40%	41–60%	61–80%	81–100%	Total
Potatoes	25%	12%	11%	10%	11%	31%	100%
Fresh milk	49%	14%	9%	5%	4%	19%	100%
Cream	65%	16%	6%	4%	5%	4%	100%
Butter	70%	14%	5%	7%	3%	1%	100%
Cottage cheese	55%	19%	9%	7%	6%	5%	100%
Eggs	23%	9%	7%	10%	17%	35%	100%
Pork meat	44%	15%	11%	13%	8%	10%	100%
Poultry	33%	17%	14%	17%	10%	9%	100%
Fresh vegetables	10%	12%	17%	22%	22%	18%	100%
Fresh fruit	12%	17%	21%	21%	15%	13%	100%
Herbs	34%	32%	13%	11%	6%	4%	100%
Cold cuts, sausage, giblets	36%	20%	15%	10%	10%	10%	100%
Fruit preserves (e.g. jams)	8%	17%	16%	13%	18%	28%	100%
Vegetable preserves (e.g. pickled cucumbers)	10%	12%	14%	14%	18%	32%	100%
Dried fruits and vegetables	44%	26%	11%	8%	6%	5%	100%
Fruit / vegetable juices	34%	29%	13%	11%	7%	7%	100%
Baking bread	55%	22%	8%	5%	5%	4%	100%
Baking cakes	12%	13%	11%	16%	20%	28%	100%

Source: own calculations.

The majority of the surveyed households consumed the following products procured almost entirely from own production: eggs (35%), vegetable preserves (32%), potatoes (31%), fruit preserves (28%), cakes (28%), milk (19%). The least popular was the production of butter; 70% of the respondents answered that they do not that produce butter for themselves. The extent of consumption of fruit and fruit preserves from self-supply in the surveyed households varied. It seems that more households declared that they prepare fruit preserves by their own, while only 8% of respondents did not do it at all. Usually, owned agricultural holdings or allotment gardens were the sources of fruitsuch as: apples, pears, plums, berries (e.g., strawberries).

Based on the data supplemented this way, the mean for all input variables was calculated, which allowed to obtain an index of food self-supply. The index values range from 0 (lack of self-supply) to 5 (a high level of food self-supply). The distribution of the index of food self-supply for the surveyed households is presented in figure 1.

Figure 1. Distribution of the food self-supply index for the surveyed households.



Source: own calculations.

Descriptive statistics for the index of food self-supply are presented in table 2. A strong concentration near the mean and the median can be observed, with their values not exceeding 2. The majority of respondents indicated quite a low level of food self-supply. The relatively high (positive) skewness value indicates the presence of asymmetry. It is confirmed by the histogram, on which a certain group of respondents can be seen with a very high level of food self-supply (Figure 1).

Table 2. Descriptive statistics for the self-supply food index for the surveyed households.

Mean	1,896622
Standard error	0,062456
Median	1,888889
Standard deviation	1,031936
Kurtosis	-0,00583
Skewness	0,38744
Range	5
Minimum	0
Maximum	5
Sum	517,7778
Counter	273

Source: own calculations.

The next step was the analysis of relationship between the level of food self-supply and the variables describing the sociodemographic characteristics of the surveyed households (income, number of household members, number of children in the household, type of household describing the level of its connection to agriculture). In the first place, the income relationship was checked. The respondents declared their average monthly income per one household member. For this purpose, the ANOVA method was used, with the results presented in table 3.

Table 3. The results of the analysis of variance for the variable income.

Grups	Counter	Suma	Mean	Variance		
< 500	26	53,16667	2,04	0,741239		
501 – 1000	83	173,5556	2,09	1,105057		
1001-1500	58	99,94444	1,72	0,838585		
1501-2000	43	76,61111	1,78	1,036801		
>2001	47	81,88889	1,74	1,51294		
Source of variance	SS	df	MS	F	P-value	Test F
Between groups	7,120627	4	1,780157	1,660951	0,159595	2,407464
Within groups	270,0859	252	1,071769			
Total	277,2065	256				

Source: own calculations.

On the materiality level of 0.05, there were no grounds to reject H0 with the equal means, which would indicate a lack of differences in the level of food self-supply between individual income groups. However, the analysis of the means and the descriptive statistics show two broader groups which are different from each other. Therefore, the income variable was re-coded into two groups: low income (up to 1000 PLN) and medium and high income (above 1000 PLN). Next, those groups were compared using the t-test (different variances), with the results presented in table 4.

Table 4. Student's t-test for the studied variables.

	0 – 1000	1001+
Mean	2,08	1,75
Variance	1,010999	1,095413
Observations	109	148
Difference of means according to the hypothesis	0	
df	238	
t Stat	2,584629	
P (T <= t) one-sided	0,005173	
One-sided T test	1,651281	
P (T <= t) two-sided	0,010345	
Two-sided t-test	1,969982	

Source: own calculations.

This time, the p-value obtained was below 0.05, which indicates that the level of self-supply in food in low-income households (2.08) is significantly higher than in medium – and high-income households (1.75). Next, the relationship between food self-supply and the number of household members was analyzed. Using the ANOVA method, the following results were obtained (Table 5).

Table 5. The results of the variance analysis for the variable specifying the number of people in the household.

Groups	Counter	Sum	Mean	Variance		
1	125	247,6111	1,98	1,072636		
2	135	265,3889	1,97	1,130596		
3	139	268,8333	1,93	1,07325		
4	166	313,6111	1,89	1,011653		
5	160	320,8333	2,01	1,122711		
>5	151	311,2222	2,06	1,04427		
Source of variance	SS	df	MS	F	P-value	Test F
Between groups	2,72709	5	0,545418	0,50767	0,770608	2,224393
Within groups	934,6895	870	1,074356			
Total	937,4166	875				

Source: own calculations.

The p-value obtained was much higher than 0.05, which is indicative of a lack of relationship. Similarly to the income, the analysis was repeated after re-coding to a binary variable (1-4-person households vs 5+person households). Those two groups were compared using the Student's t-test, and the results are presented in table 6.

Table 6. Student's t-test for the studied variables.

	1-4	5+
Mean	1,94	2,03
Variance	1,071247	1,081916
Observations	554	311
Difference of means according to the hypothesis	0	
df	640	
t Stat	-1,29414	
P (T <= t) one-sided	0,098043	
One-sided T test	1,647238	
P (T <= t) two-sided	0,196085	
Two-sided t-test	1,963678	

Source: own calculations.

Again, the p-value shows that there are no grounds to reject H0, which means that the number of persons in a household does not affect its level of food self-supply.

The third variable analyzed was the number of children in the household. The ANOVA analysis provided the following results (Table 7).

Table 7. The results of the variance analysis for the variable describing the number of children in the household.

Groups	Counter	Sum	Mean	Variance		
0	226	420	1,86	0,994979		
1	149	299,1667	2,01	1,188523		
2	133	266,2778	2,00	1,080687		
3	125	252,5556	2,02	1,062203		
4	123	246,7222	2,01	1,069663		
>4	122	245,2778	2,01	1,07455		
Source of variance	SS	df	MS	F	P-value	Test F
Between groups	3,840627	5	0,768125	0,716634	0,611022	2,22437
Within groups	934,6549	872	1,071852			
Total	938,4955	877				

Source: own calculations.

On the materiality level of 0.05, there are no grounds to reject H0 about the equality of the average level of food self-supply in households with different numbers of children. Next, the results were repeated, taking into account the binarised variable (has/doesn't have children). In the Student's t-test, the results presented in table 8 were obtained.

Table 8. Student's t-test for the studied variables.

	0	1+
Mean	1,86	2,01
Variance	0,994979	1,091872
Observations	226	652
Difference of means according to the hypothesis	0	
df	408	
t Stat	-1,93435	
P (T <= t) one-sided	0,02688	
One-sided T test	1,648597	
P (T <= t) two-sided	0,053761	
Two-sided t-test	1,965795	

Source: own calculations.

The number of persons in a household does not affect its level of food self-supply.Next, the relationship was checked between the type of household (1, 2, 3) and the level of food self-supply. The ANOVA analysis provided the following results (Table 9).

Table 9. The results of the variance analysis for the variable describing the type of household.

Groups	Counter	Sum	Mean	Variance		
Type = 1	150	342,8889	2,286	0,903612		
Type = 2	91	149,0556	1,638	0,829517		
Type = 3	32	25,83333	0,807	0,437472		
Source of variance	SS	df	MS	F	P-value	Test F
Between groups	66,79396	2	33,39698	40,46186	4,27E-16	3,029218
Within groups	222,8564	270	0,825394			
Total	289,6503	272				

Source: own calculations.

The p-value obtained was much lower than 0.05, which is indicative of a significant relationship between the household type and the level of self-sufficiency. The analysis of the mean distribution indicates that the definitely highest level of self-sufficiency is characteristic for households of type 1 (m = 2.29), a lower level – for households of type 2 (m=1.64), and the lowest level – for households of type 3 (m = 0.81).

Discussion

The research showed that food prosumption is highly popular among the surveyed inhabitants of rural areas of mazowieckie province. On the one hand, this topic was studied by researchers in Poland at the end of the previous century (Chmielewska, 2002; Chmielewska, 2000; Kos & Nowak, 1988; Tracy, 1993; Świętochowska, 1979), but now, at the time of increasing consumer awareness, interest in healthy food, and care for the natural environment, it regains its importance. Its growing significance can be seen in particular in social sciences (Dusi, 2018).

Food prosumption is now fashionable and reflects new consumer trends (Trębska, 2020). The topic is currently being analyzed not only from the point of view of the economy (lower production costs in comparison with shopping for food on the market) but also in the aspects of health, the environment, or the society. At present, a part of consumers should also be considered entities engaging in production of food (Podda et al., 2021). Smith and Jehlička (2013) present in their research an example of widely-practiced and eco-friendly food self-supply in the post-socialist Central and Eastern Europe. In all quantitative studies conducted in the years 2005, 2010 and 2011, both in the Czech Republic and in Poland, respondents emphasized the importance of fresh and "healthy" food obtained from cultivation without or with limited use of pesticides and other chemicals. In the research, the Czech and Polish food production in households was characterized mainly as a volunteer activity, related to the feeling of enthusiasm and joy, and not a consequence of limitations, necessity, or the sense of obligation. Similarly, in their research, Veen and others (2021) state that the main reason for production of consumer goods for their own purposes was the joy of horticulture, being active outside the house, as well as personal production of food, which provides knowledge and certainty regarding its high value. As stated by Borkowska in her research, 1% of consumption constitutes self-supply, that is baking of own bread by households (Borkowska, 2014). Moreira and Fuster Morell described a very interesting initiative of inhabitants of Porto, who produce food within the framework of a food network, and then exchange the food with other inhabitants using a local currency. That research offers a specific

example proving that town dwellers can produce food using common goods. The authors claim that, in time, such behaviour will have a significant impact on sustainable development (Moreira & Fuster Morell, 2020).

A limitation of the conducted research is mainly the small sample (302 respondents), which is, nevertheless, sufficient to conduct a correct statistical analysis and to draw correct conclusions. The conducted research is not representative for the whole population of Poland. The research was directed only at representatives of rural households in one province, who have the possibility to produce food for their own purposes more often than inhabitants of towns.

Summary and concluding comments

Based on replies of the respondents concerning production of individual food items for their own purposes, an index of food self-supply was developed, which synthetically shows the food prosumption level for each household which participated in the survey. The evaluation of individual groups of food products shows that consumed most often are hen eggs, potatoes, preserves, and milk. In recent years, there have been many changes in consumer habits and expectations. A decrease in bread production and consumption can be observed. Polish people limit the consumption of bread for the benefit of fruit or vegetables. Only 4% of respondents declare that they bake bread at home. Currently, a trend can be observed in Poland to bake own bread at home. In particular, this trend has increased in the period of the COVID-19 pandemic, with record sales of bread-baking machines observed recently, according to sales reports.

By analyzing the variables describing the households, one obtains information that the level of food self-supply in low-income households is significantly higher than in medium and high-income households. This is probably related to the lower cost of producing such food. In particular, this can be a significant circumstance in periods of economic crises or high inflation. On the other hand, the number of persons in a household does not have a significant impact on the level of self-supply in food in the surveyed households. When analyzing the fact of having children, the level of food self-supply is much higher in households with children. From the analysis of the relationship

between the household type and the level of food self-supply, it follows that typical agricultural households are characterized by a higher level of food self-supply. This results from the possibility to produce food thanks to owning of an agricultural holding.

Due to the currently observed trends in consumer behaviour and choices, the issue of prosumption becomes the object of increased interest for both scientific researchers and practitioners of the economic life. The conducted research has the potential to have implications for government strategies and public policy, especially in the areas of food security, healthy eating and food waste. The transformations taking place in the structure and style of consumption implicate the need to adjust the structure of supply to the reported needs (demand) for specific goods. A large potential for development in this area can be seen in the food market and in food production for one's own purposes.

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