

HEALTH BEHAVIORS IN POLISH HOUSEHOLDS

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Abstract

Health behaviors include habits, attitudes, activities, and values respected by members of the society, and relating to their health. Among them, it can be distinguished: healthy eating habits, regular exercises, avoiding stimulants, adequate sleep and ability to cope with stress. The aim of this paper is to present the health behaviors of household members in terms of proper nutrition. The research methods were analysis of variance and cluster analysis. The research material was representative and unpublished data obtained from the household budget survey conducted by the Central Statistical Office of Poland. Households were grouped according to age and education of household members, socio-economic group of the household and location of the household. The subject of interest was the consumption of fruits, vegetables, sugar, salt and alcoholic beverages. The presence of healthy and unhealthy behaviors is varied and depends on the characteristics of households. On the basis of the results, two types of households were identified: the households with risky health behaviors, and the households engaged in a healthy lifestyle. The study showed that the household members with higher education levels generally had more favorable health behaviors in terms of proper nutrition.

Key words: consumption, health, analysis of variance, cluster analysis

JEL Code: D12, I12

Introduction

Health behaviors include habits, attitudes, activities, and values respected by members of the society, and relating to their health. Among them, it can be distinguished: healthy eating habits, regular exercises, avoiding stimulants, adequate sleep and ability to cope with stress. The aim of this paper is to present the health behaviors of household members in terms of proper nutrition.

The article analyzes the quantitative per capita consumption of fruits, vegetables, salt, sugar and alcoholic beverages in Polish households. The research material consisted of

representative and unpublished data obtained from the household budget survey conducted by the Central Statistical Office of Poland. Consuming a diet rich in fruits and vegetables is essential for the prevention of cancer (Freedman, Peña-Purcell, Friedman, Ory, Flocke, Barni, Hébert, 2014), while a high consumption of salt, sugar, and alcoholic beverages contributes to many diseases.

1 Methodology

In order to identify the types of households with a favourable consumption structure of selected food products and alcoholic beverages, the variance analysis and cluster analysis have been applied. On the other hand, the correlation indicators have been used to measure the relationship between the characteristics of the household and selected food products and alcoholic beverages.

The analysis of variance allows to compare more than two types of households separated by category of one variable (univariate analysis), or multiple variables (multivariate analysis). This analysis enables the identification of impact of individual factors, as well as the interaction between them. The survey uses an univariate analysis of variance¹. The dependent variables are the variables that determine the consumption of selected products, and the independent variables are various characteristics of the household. The essence of the analysis of variance is a breakdown of the sum of the squares of the total variance for all the observations into additive components. Comparison of the variances obtained from the factor effect and error variance, gives the answer, whether the factor plays an essential role in determining the results of the analysis (Wątroba, 2002). The analysis of variance uses the F-test (Snedecor -Fischer). The F-distribution is formed by the ratio of two independent chi-square variables divided by their respective degrees of freedom. Statistical inference is based on the results of F- test. The study assumes the significance level (α) of 0.05.

The analysis of variance is based on two assumptions. The dependent variable should be normally distributed within the groups. However, the F-test is quite robust to deviations from normality, and when the sample size is sufficiently large, the deviation from the normal distribution is not significant due to the central limit theorem. According to this theorem the distribution of the sample means will be approximately normal regardless of the distribution of the observations in the original population from which the samples were drawn (Wątroba

¹ More about this method in : Larson, M. G. (2008). Analysis of variance. *Circulation*, 117(1), 115-121. Kass, R. E., Eden, U. T., & Brown, E. N. (2014). Analysis of Variance. In *Analysis of Neural Data* (pp. 361-389). Springer New York.

2002). The second condition for the applicability of the analysis of variance assumes that the variances within each of the groups are equal (the assumption of homogeneity of variance). Although the F statistic is also largely robust to a violation of this assumption.

The correlation coefficient (ratio) is based on the equality of variance. It is unrated value ranging from 0 to 1 ($0 \leq e \leq 1$). The closer the correlation coefficient is to 1.0, the stronger the relationship between variables. The advantage of the correlation coefficient is that it does not depend on the shape of the regression. Thus it can be used in the case of the rectilinear and curved relationships. In addition, a correlation coefficient may be used for two features, one of which is unmeasurable.

A cluster analysis by Ward's method was used to identify households groups with similar levels of consumption of the selected products and alcoholic beverages. This method uses analysis of variance to estimate the distance between the clusters. (Sokołowski, 2004). Ward's method aims to minimize the sum of squared within-group deviations about the group mean, thus minimizing the variance within clusters and creating relatively homogenous groups. It is assumed that at the beginning each object is considered as a separate cluster. Then, the most similar clusters are merged and so on until all objects are combined to a single cluster. This method is considered effective because it ensures the homogeneity of objects within the clusters, while also maximizing the heterogeneity between the clusters (Ward, 1963).

2 Determinants of consumption of selected food products and alcoholic beverages

The greatest strength of the relationship with a variable "age of household head," measured by the correlation coefficient, was noted for the consumption of vegetables - the index value was 0.253, whereas the lowest correlation coefficient was observed for consumption of alcoholic beverages - 0.071.

The analysis of consumption of selected food products and alcoholic beverages demonstrated that with increasing age of the household head, the per capita consumption of fruits, vegetables, salt and sugar also increased. The highest alcohol consumption was observed in households led by young people, up to 30 years of age and in households with a head aged 60 - 70. The lowest consumption of alcoholic beverages was observed in households of people over the age of 70.

The most preferred amount of consumed vegetables, fruits and alcoholic beverages has been demonstrated in households with head aged more than 70, but high consumption of salt and sugar in these households may cause or contribute to a number of serious health issues, including heart disease. In another study (French, Rosenberg, Knuiman, 2008) on the relationship between nutrition and risk of chronic diseases, it has been shown that elderly people had better balanced diet compared to younger people, but it applies only to older people with high incomes and women. Results indicate that presence of children in the household, in households of younger people, have a deterrent effect on negative health behaviors (Umberson, 1987).

Tab. 1: Monthly per capita consumption of selected food products and alcoholic beverages by age of household head (in kg and l) in 2012.

Specification	Fruits	Vegetables	Sugar	Salt	Alcoholic drinks
Age of household head:					
Less than 30 years	2,6	4,3	0,9	0,2	1,6
30 - 40 years	2,7	4,0	0,9	0,1	1,3
40 - 50 years	2,9	4,7	1,1	0,2	1,1
50 - 60 years	3,6	5,9	1,4	0,2	1,3
60 - 70 years	4,7	7,5	1,7	0,3	1,4
70 and more years	4,5	7,0	1,7	0,3	0,9
<i>Correlation coefficient</i>	<i>0.208</i>	<i>0.253</i>	<i>0.202</i>	<i>0.165</i>	<i>0.071</i>

Source: own work

The education level of the household head is another variable significantly affecting the level of consumption of selected food products and alcoholic beverages. The values of correlation coefficients between education of the household head and level of consumption, ranged from 0.056 for the consumption of vegetables to 0,145 for the consumption of fruits. The values of the correlation coefficients between selected products and variable - "education of the household head" were slightly lower than with the variable determining the age of the household head.

The increase in education of household head favoured the health promoting behaviors, such as increased consumption of fruits and vegetables and reduced intake of sugar and salt. It was noted, however, that household whose head had higher education, consumed more alcoholic beverages.

The households whose members had higher levels of education consumed higher-quality food and with a higher nutritional value, and the parameters of the diet of people with higher education showed a better satisfaction of nutritional needs and faster adaptation to the

recommendations of specialists. (Bojar et al. 2007, Saldiva, Venancio, de Santana, da Silva Castro, Escuder, Giugliani, 2014), The households whose head had higher education showed greater concern for health (Piekut, Kludacz, 2015).

Tab. 2: Monthly per capita consumption of selected food products and alcoholic beverages by education of household head (in kg and l) in 2012.

Specification	Fruits	Vegetables	Sugar	Salt	Alcoholic drinks
Level of education of the reference person:					
Lower secondary, primary, no formal education	2,9	5,5	1,6	0,3	0,8
Basic vocational	2,8	4,9	1,3	0,2	1,0
Secondary, upper secondary vocational and upper secondary general	3,6	5,5	1,2	0,2	1,4
Tertiary	4,2	5,5	0,9	0,1	1,9
<i>Correlation coefficient</i>	<i>0.145</i>	<i>0.056</i>	<i>0.141</i>	<i>0.109</i>	<i>0.138</i>

Source: own work

Another study concerned the consumption of selected food products and alcoholic beverages depending on the location of the household. The analysis demonstrated statistically significant differences between the different types of households distinguished by the location, and the level of consumption of selected products. The highest correlation coefficient between the location of household, and the consumption of selected products has been recorded for sugar (0.191) and the lowest one for vegetables (0.038).

The best nutrition behaviors were noted in urban households, that had the highest intake of vegetables and fruits, and the smallest consumption of salt and sugar. On the other hand, households located in cities with a population over 500 thousand, had the highest consumption of alcoholic beverages.

The lowest fruits consumption was observed in rural households, and the lowest vegetables consumption - in households located in cities with population between 100,000 and 199,000. The rural households also recorded the highest intake of sugar and salt, and the smallest consumption of alcoholic beverages.

Other studies (Jeżewska-Zychowicz, 1998) emphasized that a nutritional deficiency was significantly more common in rural areas than in urban ones, but it was stressed that in both environments, the way of nutrition was determined by education and age of household head and financial situation of household.

Tab. 3: Monthly per capita consumption of selected food products and alcoholic beverages by location of household (in kg and l) in 2012.

Specification	Fruits	Vegetables	Sugar	Salt	Alcoholic drinks
Location:					
Urban cities with population over 500.000	4,0	5,6	0,8	0,1	1,8
Urban cities with population between 200.000 – 499.000	3,6	5,1	0,9	0,2	1,7
Urban cities with population between 100.000 – 199.000	3,3	4,9	0,9	0,2	1,6
Urban cities with population between 20.000- 99.000	3,5	5,2	1,1	0,2	1,3
Urban cities with population between less than 20.000	3,3	5,4	1,2	0,2	1,1
Rural areas	3,0	5,4	1,5	0,2	1,0
<i>Correlation coefficient</i>	<i>0.089</i>	<i>0.038</i>	<i>0.191</i>	<i>0.097</i>	<i>0.124</i>

Source: own work

The next step of the study was to analyze the health behaviors related to the consumption of selected products depending on socio-economic status of the household. The variable defining the socio-economic status of the household, significantly affected the level of consumption of selected products. The values of correlation coefficients ranged from 0,120 for alcoholic beverages to 0,2195 for sugar.

The highest consumption of fruits and vegetables was observed in households of pensioners, these households also consume the largest quantities of sugar and salt. On the other hand, the largest amount of alcoholic beverages were consumed by white-collar and self-employed households. The lowest consumption of fruits and vegetables was observed in families living on supplementary welfare allowance, these households also consume the lowest quantities of sugar, salt and alcoholic beverages. It was observed, that the structure of consumption of selected products (with the exception of alcoholic beverages) was more favourable in white-collar households than in blue-collar households.

Tab. 4: Monthly per capita consumption of selected food products and alcoholic beverages by socio-economic status of the household (in kg and l) in 2012.

Specification	Fruits	Vegetables	Sugar	Salt	Alcoholic beverages
Socio-economic situation of households:					
Blue-collar households	2,5	4,5	1,1	0,2	1,1
White-collar households	3,6	4,9	0,9	0,1	1,7
Farmers	3,2	5,7	1,8	0,3	0,9
The self-employed households	3,4	4,9	0,9	0,1	1,5
Retirees	4,6	7,2	1,7	0,3	1,2
Pensioners	3,6	6,3	1,6	0,3	0,8
Families living on supplementary welfare allowance	2,2	4,2	1,2	0,2	0,6
Households having income from non-commercial sources	2,8	4,3	0,8	0,1	1,6
<i>Correlation coefficient</i>	<i>0.206</i>	<i>0.216</i>	<i>0.219</i>	<i>0.164</i>	<i>0.120</i>

Source: own work

3 Groups of households with similar behavior regarding consumption of selected food products and alcoholic beverages

On the basis of the cluster analysis, we distinguished four groups of households characterized by a similar level of consumption of selected food products and alcoholic beverages.

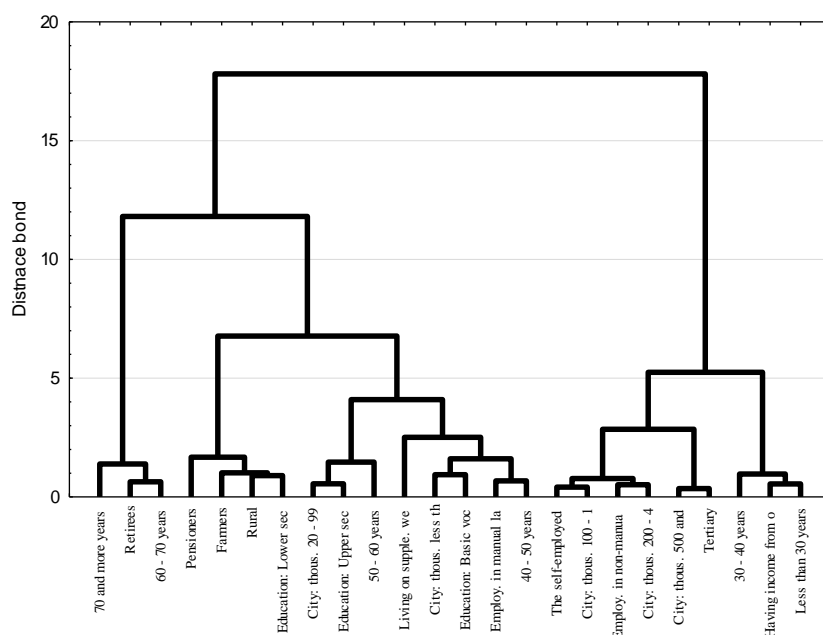
The first cluster contained the households led by people aged 60 years or more, and households of retirees. A characteristic feature of these households was the highest intake of fruits, vegetables, salt and sugar. While the consumption of alcoholic beverages ranged from a low to a high level depending on the age of the household head.

The second cluster included households of pensioners, farmers, rural residents and households of people with the lowest levels of education. A characteristic feature of these households was moderate consumption of fruits and vegetables, a relatively high intake of sugar and salt and a low consumption of alcoholic beverages.

The third cluster contained the households located in cities with population under 100,000, households whose head had vocational and secondary level of education, household with a head aged between 40 and 60, as well as households of blue-collar workers and households having income from non-commercial sources. A characteristic feature of these households was moderate consumption of fruits and vegetables, a relatively high intake of sugar and salt and moderate consumption of alcoholic beverages. Increasing awareness of proper nutrition, in particular, realization of the need for higher consumption of fruits and vegetables and limitation of salt and sugar, should improve the model of nutrition in the households from the second and third cluster.

The last cluster included the self-employed households, white-collar households, and households having income from non-commercial sources, as well as households with members aged under 40, with a higher education level and households located in cities with population below 100,000. These households demonstrated a relatively high intake of alcoholic beverages, a low intake of salt and sugar, and a moderate intake of fruits and vegetables. The structure of consumption in these households, is adapted to the recommendations of nutritionists, but high intake of alcoholic beverages can adversely affect the health of their members. In the context of the results, it would be worth to perform the multivariate analysis in order to select the households, which are particularly vulnerable to the effects of excessive alcohol consumption.

Fig. 1. Clusters of households with similar consumption level of selected food products and alcoholic beverages



Conclusion

The study allowed us to achieve the objective. The households led by people aged 60 years or more and households of pensioners consumed the highest amount of vegetables and fruits, but on the other hand, a high intake of salt and sugar in these households can contribute to development of chronic diseases (hypertension, diabetes). Favorable consumption level of fruits, vegetable, sugar and salt has been noted in households of people with higher education level and in households located in the largest cities. At the same time, these households demonstrated a high consumption of alcoholic beverages. Adverse consumption level of fruits, vegetable, sugar and salt has been noted in households of farmers, on the other hand these households demonstrated a low consumption of alcoholic beverages. It becomes necessary to constantly improve social awareness of proper nutrition. These announcement, however, should be differentiated according to the types of households.

The characteristics of the household, such as: the age of the household head, and socio-economic status of household, had the strongest impact on the fruits and vegetables consumption. The consumption level of sugar and salt was most strongly associated with the socio-economic status of household. On the other hand, the strongest determinants of

alcoholic beverages consumption were education head of the household head and the location of the household.

The results indicate, that there is no type of household, which demonstrates only positive health behaviors regarding nutrition. The relatively best nutrition behaviors were observed in households of people with higher education level, as well as in white-collar households and self-employed households.

The results of the study, however, tend to the conclusion that further analysis using multivariate statistical methods, are necessary to observe the level of food consumption in the various types of households.

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