

NUTRITION VERSUS METABOLIC DISEASES IN THE OPINION OF THE COMMUNITY OF THE PODKARPACIE COUNTY

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Abstract. This work defines the level of consumers' awareness regarding healthy eating and the risk of developing specific metabolic diseases as a result of an improper diet. The strongest conviction observed among the respondents is that diet can cause health problems resulting from obesity. The respondents also noticed the influence of diet on developing of such diseases as diabetes, digestion disorders and circulation problems. Improper nutrition was perceived as an equally important factor contributing to the development of metabolic diseases as stress, environmental pollution and lack of physical activity. It was also noted that the respondents who were convinced that their own diet was proper and that they possessed adequate knowledge of the subject were not always fully aware of the link between nutrition and the predisposition for specific metabolic diseases.

Key words: metabolic diseases, diet, nutritional awareness

INTRODUCTION

For centuries humans were forced to deal with a deficit rather than excess of food. For this reason, the human genotype evolved as to favor the ability to accumulate energetic substances (fats) in the body rather than processing their excess. The accumulated substances served as energy sources in the periods of food deficit. The human environment changed profoundly at the turn of the twentieth century. The increase in scientific knowledge brought about the progress in technology, which in turn led to drastic socio-economic changes. One of these changes, especially visible in highly-industrialized countries, was the migration of the rural population into urban settings. The improvement in the economic situation of this population was one of the factors influencing the higher demand for various products, including food products. This resulted in the modification of diet which now involved a high intake of protein, fats and refined carbohydrates. The most recent example of such changes is China, where in the 1980s, the typical diet of urban communities consisted of rice, oatmeal, cabbage, and occasionally, pork. Today, on the account of their higher income, urban dwellers in China tend to

purchase some food products typically encountered in western countries [Bhandari and Smith 2000].

In general, households now tend to invest in highly-processed foods with a lessened content of their natural ingredients. As a consequence, consumers frequently develop a variety of metabolic diseases, sometimes described as civilization disorders [Przyslawski and Gertig 1997]. However, recent experiments in the field of preventing and breaking unhealthy nutritional habits indicate that, for most consumers, the taste and the appearance of food products are more important than their nutritional value. Even though an increasing percentage of consumers seems to be interested in the rules of healthy eating, they are apparently confused by conflicting theories describing the role of food and eating in preventing disorders and sustaining the optimal vitality. Nutritional habits, acquired by a consumer during his lifetime, force him to resign of the traditional way of eating. It can also be noted that women, as compared to men, are more concerned with their own health, as well as with the health of their family members [Biloukha and Utermohlen 2000, Emmons et al. 1999].

All these tendencies have also become apparent within the Polish society, particularly in the most recent years. It seems that the traditional Polish way of eating and individual habits of Polish consumers play a decisive role in developing civilization disorders on such a large scale. It is observed that the majority of deaths in Poland is caused by two types of these disorders: circulation disorders and cancerous tumors. At the same time, the awareness of relations between the quality of eating and personal health is at an insufficient level.

For this reason, the Chair of the Manufacture and Commodity Science at the University of Rzeszów has initiated the research aimed at defining the level of consumers' awareness with respect to healthy eating and to the risk of developing specific metabolic diseases as a result of an improper diet.

SCOPE AND METHODS

The research was conducted in the years 2001-2002 by the method of a questionnaire survey [Sudoł and Haffner 2000] within selected districts of the Podkarpacie county. Respondents were chosen from among the individuals who had previously declared to be decision-makers, as far as the eating habits are concerned, in their households. The respondents were asked to answer questions related to the following issues included in the survey:

- descriptive (socio-economic) characterization of the respondents: their gender, age, education, place of residence, household income;
- behavioral characterization of the respondents (awareness and education in the area of eating, as well as eating behavior): evaluation of their own awareness and knowledge of the rules of healthy eating, evaluation of their own eating habits and the changes of these habits within the past ten years, preferences among given food groups, general opinion regarding the influence of the quality of eating on civilization disorders;
- personal opinion regarding the link between the quality of eating and the occurrence of the following civilization disorders: diabetes, circulatory diseases, digestive system disorders, obesity, teeth and gum diseases, tumors and allergies; the respondents expressed their views on a graphic scale whose extremes corresponded to the following statements: “I believe that eating has no influence” and “I believe that eating has an

extremely strong influence” (a 100-point scale was assumed in which the former statement was given 0 points and the latter statement – 100 points);

– importance of the following factors influencing civilization disorders: environmental pollution, stress, the lack of physical activity, improper nutrition, genetic factors.

Altogether, 200 surveys were conducted and analyzed. The surveys were completed by individuals of both genders (however, more than 80% of them were females), between the ages 19-66 years, with different levels of household income and different percentages of this income spent on food. More than 50% of respondents completed the secondary education, and approximately 20% completed the post-secondary education. They were residents of both rural (45%) and urban areas (55%).

The majority of respondents, almost two-thirds of them, believes that their nutritional awareness and their level of education in this field can be classified as average. Almost one half of the respondents have changed their eating habits within the past ten years. Also, almost one half of the respondents expressed their preference for low-energy foods. Only about 10% of the respondents believes that their diet is traditional. Nearly 85% shares the opinion that the quality of food influences the development of civilization disorders.

In order to determine if the descriptive and the behavioral characterizations of the respondents influence this opinion, the results were analyzed with statistical methods. At the first stage, the packet Anova of the computer program Statistica was used in order to perform calculations according to the method of variance analysis. The deduction was carried out with the assumed significance level of $\alpha = 0.05$. At the second stage, the principal component analysis was conducted with the help of the packet Factor Analysis of Statistica. The basis of the calculations was formed by correlation matrices, estimation of factor loadings was done by the Hotelling method, and the Kaiser method was employed to establish the number of principal components.

RESULTS AND DISCUSSION

The respondents' opinions regarding the link between the diet and the occurrence of certain civilization disorders, specified in the survey, are graphically displayed by Figure 1. The strongest belief among the respondents was that diet most apparently causes the health problems arising from obesity. The average value of over 80 points emphasizes the opinion that eating may lead a consumer to develop obesity. The respondents also expressed the view that one cannot rule out the possibility that diet influences such civilization disorders as: diabetes, digestive system diseases, and circulatory problems. The value of this response, with its average around 60 points, can be interpreted as “eating likely affects the occurrence of the disease”. On the other hand, most respondents did not see the link between eating and the occurrence of teeth and gum diseases (cavities), cancer, and allergies. In this case, the response's average numerical value lies in the vicinity of 40 points, which is explained interpreted as “eating not likely affects the occurrence of the disease”. To a certain extent, these results correspond to the results of the surveys conducted among 14,000 residents of European Union countries [Lappalainen et al. 1998]. The highest percentage of respondents (49%) associates healthy eating with a low-fat diet, about 40% of respondents – with a properly balanced high-variety diet based on fruit and vegetables, and only a limited number of respondents points to a low-sugar diet rich in fiber.

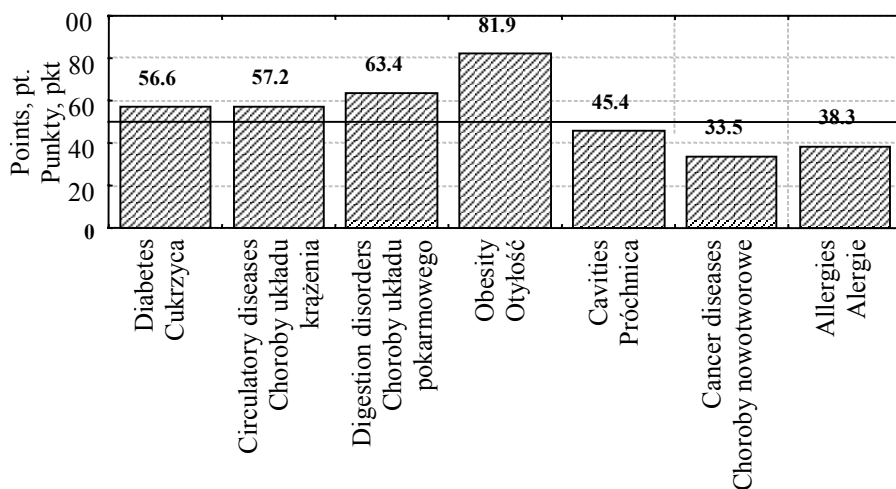


Fig. 1. The influence of nutrition on the metabolic diseases in opinion of respondents
Rys. 1. Wpływ żywienia na choroby metaboliczne w opinii respondentów

It is worth noting the respondents' opinions on how eating ranks among other factors which, according to the literature, determine the occurrence frequency of civilization disorders. As Table 1 illustrates, improper diet is as important a factor as stress, environmental pollution and lack of physical activity. The average values of all these factors are similar. It means that the hygiene of eating and eating habits are not necessarily treated as sole health-determining factors. It should be added that the average values of the importance of the factors given in the survey, calculated for all segments of the population (differing in both descriptive and behavioral traits) show no preference in treatment of these factors by the respondents.

Table 1. The rank of the factors determining development of the metabolic diseases
Tabela 1. Ranga czynników wpływających na rozwój chorób metabolicznych

Factor Czynnik	Mean rank Średnia ranga
Pollution of environment Skażenie środowiska	2.76
Stress Stres	2.97
Lack of physical activity Brak aktywności fizycznej	2.82
Improper nutrition Nieodpowiednie żywienie	3.00
Genetic factors Czynniki genetyczne	3.98

Table 2 displays the results of variance analysis, the purpose of which was to verify the hypothesis of the influence of the descriptive traits mentioned above on the evaluations given in the survey. The averages of the evaluation indicators for each segment of the population, as presented in this chart, together with the calculated values of the F-test, allow to distinguish the differences among the opinions given by the population segments.

The most influential traits in this regard were the age and the education of the respondents. Relatively young respondents (under the age of 25 years), compared with older respondents, generally overlooked the role played by diet in a personal predisposition to develop diabetes, circulation disfunctions, and cavities. It can also be stated that the same age group placed less emphasis on diet as a factor causing digestive system diseases, cancer, and allergic reactions (although the assumed zero hypothesis cannot be rejected on the basis of the F-test). The respondents with only primary education, as compared with the respondents whose education level was at least secondary, associate eating habits with the possibility of developing several disorders; namely: cavities, cancerous tumors, and allergies (the values of the F-test were statistically significant in these cases), as well as diabetes, circulatory problems, and digestive system disorders.

A descriptive trait which also has to be taken into account in the discussion is the household income. The results shown in Table 1 prove the opinion that the higher the income, the higher the awareness of household members as to the possibility of developing several diseases, including digestive system disorders, and allergic reactions to food (the values of the F-test were statistically significant), as well as circulation problems, cavities and cancer.

Other traits: gender, place of residence, and the percentage of income spent on food; seem to have no influence on differences in the opinions discussed herein. The fact that there are no differences in the opinions between members of different genders is rather surprising, as the literature dealing with this topic points to women as expressing much more interest in the rules of healthy eating (which cannot be equated with avoiding by them the food products and meals carrying a high health risk) [Lappalainen et al. 1998, Meer and Misner 2000, Tepper et al. 1997]. Also, according to Barker et al. [1995], the knowledge of Northern Ireland female citizens regarding the influence of fat and fiber intake on the occurrence of diseases is higher, as compared with the knowledge expressed by male respondents. Assuming that the theory of a high consumption of fruit and vegetables being an indicator of high consumer awareness is true [Wardle et al. 2000], it can be noted that also the research conducted among the residents of Lvov shows a higher awareness among women [Biloukha and Utermohlen 2000].

Table 3 displays the results of the analysis, the purpose of which was to verify the hypothesis of the influence of the behavioral traits mentioned above on the evaluations given in the survey. In many cases, the calculated values of the F-test have a high significance, therefore allow to reject the assumed zero hypothesis. In other cases, the differences between average values of the indicator also suggest a differentiation of opinions among various segments of the population.

The respondents who described their knowledge of eating rules as high, also expressed a stronger belief in the link between diet and the predisposition for diabetes, teeth and gum diseases, tumors, and allergies, and also for circulation problems. Similarly, the respondents who believe that their eating habits are proper, are more convinced that diet and eating habits influence almost all civilization disorders (except obesity and allergic reactions).

Table 2. The influence of the descriptive characteristics of the respondents on their view on the influence of nutrition on retirement of the metabolic diseases

Tabela 2. Wpływ cech deskryptywnych respondentów na ich poglądy na temat wpływu żywienia na choroby metaboliczne

Factor Cecha	Segment Segment	Diseases – Choroby						
		Diabetes Cukrzyca	Circulation problems Krażenie	Digestion disorders Trawienie	Obesity Otyłość	Cavities Próchnica	Cancer Nowotwór	Allergies Alergie
Mean values and test F – Wartości średniej i test F								
Gender Płeć	women kobieta	57.3	57.2	69.3	86.2	33.8	27.5	41,9
	men mężczyzna	56.5	57.2	62.3	81.1	47.6	34.7	37,6
	F	0,029	0.000	2.021	1.243	5.563*	1.796	0.746
Age Wiek	to 25 years do 25 lat	47.6 a	46.5 a	57.3	82.1	30.1 a	25.9	35,8
	26-45 years 26-45 lat	60.0 b	59.4 b	63.4	49.4	49.9 b	36.2	38,4
	above 45 years powyżej 45 lat	55.7 b	58.8 b	66.2	85.5	45.8 b	33.1	39,2
F	2,950*	3.551*	1.295	1.403	5.365*	1.650	0.200	
Level of education Wykształcenie	post-secondary wyższe	59.2	61.3	62.8	79.9	47.8 b	40.4 b	43,1 b
	secondary średnie	58.2	57.2	65.7	81.1	50.3 b	34.3 b	40,0 b
	primary podstawowe	49.0	52.0	57.8	86.7	29.3 a	22.5 a	27,2 a
F	2,286	1.621	1.444	1.093	7.778*	5.073*	5.345*	
Household income Dochód	to 500 zł do 500 zł	55.7	55.6	60.0 a	82.2	39.9	29.1	34,6 a
	501-700 zł 501-700 zł	59.3	56.8	62.2 a	79.9	48.9	38.0	38,2 ab
	above 700 zł powyżej 700 zł	53.8	60.9	71.6 b	84.7	50.2	34.6	45,4 b
F	0,733	0.663	3.173*	0.573	2.466	2.096	2.737*	
% of income spent on food % dochodu przeznaczone- go na żywność	low niski	60.9	57.6	54.2 a	89.1	39.7	25.2	26,5 a
	medium średni	55.6	57.8	64.5 b	80.1	47.4	36.7	41,5 b
	high wysoki	60.1	56.7	69.0 b	82.0	45.7	30.8	36,9 b
F	0,808	0.026	2.854*	1.749	0.775	2.403	4.431*	
Place of residence Miejsce zamieszkania	urban areas miasto	56.6	58.9	67.7	82.7	47.3	36.4	38,5
	rural areas wieś	56.7	55.1	58.1	80.9	45.2	30.0	37,9
	F	0,001	1.155	7.097*	0.281	0.894	2.667	0.030

*Means statistically significant value of the test F at level $\alpha = 0.05$.

The different letters at the values of the mean denote unhomogeneous segments in the post-hoc analysis.

*Oznacza statystycznie istotną wartość testu F przy poziomie $\alpha = 0,05$.

Różne litery przy wartościach średniej oznaczają niejednorodne segmenty w analizie post-hoc.

Table 3. The influence of the behavioral characteristics of the respondents on their view on the influence of nutrition on retirement of the metabolic diseases

Tabela 3. Wpływ cech behawioralnych respondentów na ich poglądy na temat wpływu żywienia na choroby metaboliczne

Factor Cecha	Segment Segment	Diseases – Choroby						
		Diabetes Cukrzyca	Circulation problems Krażenie	Digestion disorders Trawienie	Obesity Otyłość	Cavities Próchnica	Cancer Nowotwór	Allergies Alergie
Mean values and test F – Wartości średniej i test F								
View on nutrition conscience Ocena znajomości zasad żywienia	low niska	53.9 a	51.8	63.2	81.4	33.4 a	32.7 a	32.9 a
	medium średnia	54.5 a	57.0	62.5	81.8	44.9 a	31.2 a	36.8 a
	high wysoka	68.1 b	64.2	67.2	82.7	60.9 b	43.5 b	50.0 b
	F	4,182*	2.254	0.442	0.026	7.766*	2.677*	4.845*
View feed Ocena własnego odżywiania	irregular nieprawidłowe	50.6	50.4	54.3 a	81.0	37.2 a	27.9	32.8
	average przeciętne	56.6	57.8	64.7 b	82.3	43.0 a	33.8	39.2
	regular prawidłowe	62.1	60.9	66.5 b	81.4	61.6 b	37.6	39.9
	F	1,773	1.682	2.539*	0.051	7.188*	1.082	0.907
Feed change Zmiana żywienia	yes – tak	60.2	63.3	66.6	77.2	53.4	43.9	45.9
	no – nie	53.5	51.9	60.6	86.0	38.6	24.6	31.7
	F	3,599*	10.961*	2.758*	7.260*	12.662*	27.582*	17.192*
Declared food preferences Deklarowane preferencje wobec ży- wności	traditional tradycyjne	60.4 b	68.4 b	60.0 a	81.6	63.2 b	45.2 b	44.2 b
	enrichment wzbogacone	65.3 b	68.4 b	69.1 b	83.0	54.6 b	43.8 b	45.2 b
	low energetic niskoenergetycz- ne	50.2 a	49.0 a	59.3 a	82.6	35.7 a	24.5 a	33.9 a
	probiotic probiotyczne	59.4 b	53.5 a	70.9 b	76.4	61.2 b	39.8 b	35.6 a
F	4,648*	10.017*	2.397*	0.363	9.977*	8.322*	3.088*	
View on the influence of feed on dis- eases Pogląd na temat wpływu żywienia na choroby	yes – tak	55.5	55.5	62.5	82.0	43.9	31.3	36.5
	no – nie	62.8	66.3	68.1	81.1	54.0	46.0	47.7
	F	2,206	5.123*	1.239	0.015	3.001*	7.710*	5.311*

*Means statistically significant value of the test F at level $\alpha = 0.05$.

The different letters at the values of the mean denote unhomogeneous segments in the post-hoc analysis.

*Oznacza statystycznie istotną wartość testu F przy poziomie $\alpha = 0,05$.

Różne litery przy wartościach średniej oznaczają niejednorodne segmenty w analizie post-hoc.

Table 4. The nutrition conscience and the knowledge about the influence of the nutrition on retirement of the metabolic diseases – the results of PCA (the values of the factor loadings)
 Tabela 4. Znajomość zasad żywienia i wiedza o wpływie żywienia na choroby metaboliczne – rezultaty analizy głównych składowych (wartości ładunków czynnikowych)

Estimate of – Ocena	PC 1	PC 2	PC 3
Own nutrition conscience Własnej znajomości zasad żywienia	0.103	0.139	0.746
Own feed Własnego odżywiania	0.037	-0.022	0.807
The influence of the nutrition on retirement of diabetes Wpływu żywienia na cukrzycę	0.710	0.215	0.170
The influence of the nutrition on retirement of circulatory diseases Wpływu żywienia na choroby układu krążenia	0.746	0.291	0.071
The influence of the nutrition on retirement of digestion disorders Wpływu żywienia na choroby układu pokarmowego	0.712	0.076	0.001
The influence of the nutrition on retirement of obesity Wpływu żywienia na otyłość	0.581	-0.661	-0.035
The influence of the nutrition on retirement of cavities Wpływu żywienia na próchnicę	0.537	0.575	0.265
The influence of the nutrition on retirement of cancer Wpływu żywienia na choroby nowotworowe	0.393	0.764	0.038
The influence of the nutrition on retirement of allergies Wpływu żywienia na alergię	0.208	0.707	0.049

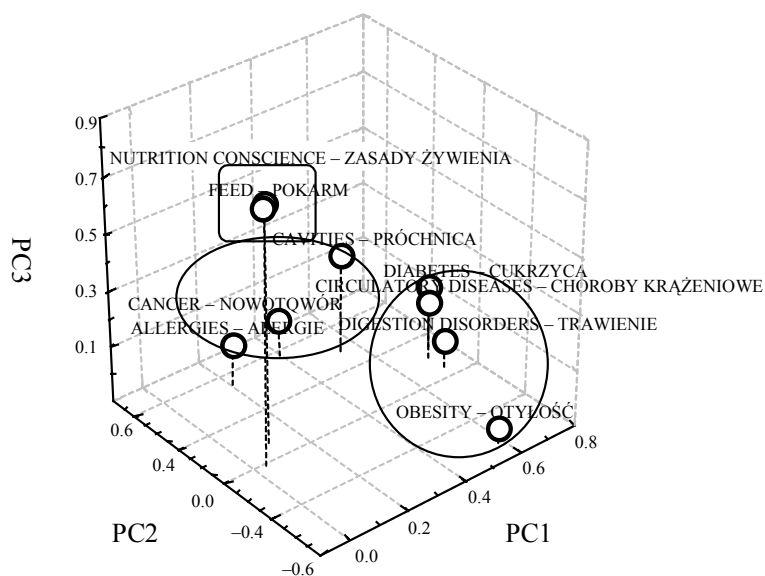


Fig. 2. The configuration of the variables (estimate of the nutrition conscience and the knowledge about the influence of the nutrition on retirement of the metabolic diseases)

Rys. 2. Konfiguracja zmiennych (ocena znajomości zasad żywienia i wiedza o wpływie żywienia na choroby metaboliczne)

The individuals who have changed their eating habits within the past ten years express a more decisive opinion with regard to the relation between eating and all the civilization disorders (except obesity) mentioned in the survey.

The surveyed population can be divided into two groups. The first group consists of individuals who prefer traditional food and diet, or the ones who prefer food enriched in nutrients. The second group consists of individuals who base their diet on low-energy products or pro-biotic foods. The first group expresses a stronger belief that eating can create a risk of developing diabetes, circulation problems, cavities, tumors, and allergies. A different distinction can be made with respect to the influence of diet on digestive track disorders. The conviction that such an influence is strong is expressed by the respondents whose diet is mostly based on health food products.

The results of the PCA is presented in Table 4 and in Figure 2. The calculations show that all the assumed variables (of the evaluation of one's own awareness and eating habits and the evaluation of the influence of diet on the occurrence of civilization disorders) correspond with the three orthogonal components. Moreover, the factor loadings imply that the evaluation of one's own awareness and eating habits generates the principal component 3, whereas the principal component 1 illustrates the opinions about the link between diet and diabetes, circulation problems, and obesity. The principal component 2 represents the views on the influence of diet on the development of cavities, cancerous tumors, and allergies. It should be stated that the confidence in one's personal knowledge of the rules of healthy eating and the conviction that one's own diet follows these rules do not always coincide with the awareness of the link between the food consumed and the predisposition for specific civilization disorders.

The results of the survey indicate the necessity of educating the Polish society in the field of healthy eating. A systematic education should focus on informing the society about the risk involved in consuming certain products and the types of health problems that can arise as a result of the contamination of food or not following the hygiene of eating.

Two major elements, mentioned in the literature, need special emphasis, as they determine the effectiveness of this type of education. They are the sources and barriers of educational information and the psychological motivation of accepting the information given.

According to Lappalainen et al. [1998], for the consumers residing in the European Union countries, the main source of the information about healthy eating are radio and television programs, and also magazine articles. Less important than these is expert advice. These consumers view lack of time for meal preparation as the main barrier in modifying their habitual diet according to their knowledge. The research conducted among Arizona residents also shows that their main source of information about the safety of food are television programs (50% of responses) [Meer and Misner 2000].

Bonny [2000] indicates the psychological motives which decide to what degree a consumer is aware of the health risk and which can therefore decrease the effectiveness of the received information. These motives include: the belief that one is able to recognize the risk by himself or herself; "the catastrophe syndrome" (the feeling of being at risk is in the case of improper eating usually too weak, as the consequences of an unhealthy lifestyle are spread over time and space; e.g. the news of a single tragedy involving several lives creates a much bigger impression than scientific discoveries), and the level of scientific uncertainty (dangers that are not fully recognized and described create more insecurity). Miles and Frewer [2001] point to the fact that the public perception of the information related to health risks also depends on the confidence in scientific research and on the law system existing in a given country.

Frewer and Miles [2000] also describe the trait of the human psyche which they call "the optimistic bias". The optimistic bias is a conviction which causes one to believe that his vulnerability to a specific risk is lower than the one of another person or of another social group. The optimistic bias is also apparent when one considers the health dangers caused by high-fat diet, alcohol abuse, pesticides used in agriculture, genetic modifications of food and use of microwave ovens.

The education in the field of healthy eating should be linked to a more general field of promoting health-conducive lifestyles and also to promoting functional food. This type of food does not differ significantly from the traditional products, as far as organoleptic characteristics are concerned, but which are abundant in active biological components having a positive and clinically proven influence on human health; both physical and mental condition. This type of food is able to alleviate illness-generating changes in the body, resulting from an improper diet [Zduńczyk 1999, Krygier 2002, Pisulewski and Pisulewska 1999, Frewer 1998, Wahlqvist 2000].

CONCLUSIONS

1. The surveyed population of the Podkarpace region expresses the opinion that improper diet contributes to the generation of metabolic diseases to the same degree as stress, environmental pollution, and lack of exercise. However, diet and food quality are not perceived as a health-determining factor.

2. The majority of people agree that both the quality of food and the quality of eating influences the generation of civilization disorders; however, relatively young individuals (under 25 years of age) overlook the role of eating in developing an inclination towards diabetes, circulation disorders, and teeth and gum diseases.

3. The conviction that there is a clear link between eating habits and obesity-driven disorders is most clearly visible. Also, the respondents perceive the influence of diet on the generation of diabetes, digestive track disorders, and circulation disorders.

4. The individuals who believe that their eating habits are proper see a clear link between eating habits and the occurrence of almost all civilization disorders.

5. The subjective belief that one's own knowledge in the area of nutrition and one's own eating habits are proper does not always coincide with the awareness of how diet influences one's health, which shows the necessity of educating the population of the Podkarpace region on the causes of civilization disorders.

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ŻYWIENIE A CHOROBY METABOLICZNE W OPINII SPOŁECZNOŚCI PODKARPACKIEJ

Streszczenie. Określono poziom świadomości respondentów w zakresie zdrowego odżywiania oraz w zakresie ryzyka wystąpienia określonych metabolicznych chorób, będących skutkiem błędów w odżywianiu. Stwierdzono, że przekonanie o związku sposobu odżywiania z problemami zdrowotnymi wynikającymi z nadmiernej masy ciała jest najmocniejsze. Respondenci dostrzegali też wpływ diety na pojawianie się takich schorzeń, jak cukrzyca, choroby układu pokarmowego i choroby układu krążenia. Niewłaściwe odżywianie uznano za czynnik równie ważki w powstawaniu chorób metabolicznych jak stres, skażenie środowiska i brak ruchu. Stwierdzono też, że subiektywne poczucie własnej dużej wiedzy o zasadach prawidłowego odżywiania oraz przeświadczenie o prawidłowości własnej diety nie idzie w parze z wiedzą o powiązaniu jakości odżywiania z zapadalnością na poszczególne choroby metaboliczne.

Słowa kluczowe: choroby metaboliczne, dieta, świadomość żywieniowa

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