

## DIET OF THE ORGANIC FOOD CONSUMERS FROM WARSAW. A COMPARATIVE STUDY

Iwona Florczak<sup>1</sup>, Ewa Rembiałkowska<sup>2</sup>

<sup>1</sup>Warsaw University of Life Sciences, Faculty of Production Engineering,  
Department of Production Management and Engineering, Nowoursynowska 164, 02-787 Warsaw, Poland,

<sup>2</sup>Warsaw University of Life Sciences, Faculty of Human Nutrition and Consumer Sciences,  
Division of Organic Food, Nowoursynowska 159c, 02-776 Warsaw, Poland

\*E-mail: iwona\_florczak@sggw.pl

### Abstract

*Consumers are increasingly turning to organically produced food. In addition, there are a growing number of people who prefer a healthy lifestyle manifested, inter alia, by the increase in the consumption of organic products.*

*The aim of the study was to verify the assumption that organic food consumers – according to their judgments – have a better diet than the conventional ones.*

*A direct interview based on a survey was conducted in Poland (Warsaw) in 2009-2010. A group of men and women aged 26-55 were the respondents. The results were developed using a self-assessment indicator of diet quality. The significance of differences between the group indicators was compared by one-way ANOVA using the Statistica software. There were found significant nutrition differences between the analysed indicators for the groups. The greatest differences between the obtained results were mainly recorded in the case of the men and women consuming organic food. However, when comparing the studied groups in terms of diet and sex, the men declaring eco-friendly diet obtained a significantly worst result. Statistically significant differences were recorded for the diet of consumers not differentiated by sex. In this case, organic food consumers come off better. It has been estimated that the largest (significant) impact on diet have the following factors: a type of food consumed, i.e. conventional/organic food, proportion of organic food in diet, the period of organic food consumption, the number of children under 18, and education. The study results indicate that organic food consumers have healthier eating habits and their diet is better than the one of conventional consumers.*

**Keywords:** organic consumer, conventional consumer, health, eating habits, consumption

Submitted: 23.03.2015

Reviewed: 14.05.2015

Accepted: 08.06.2015

### 1. INTRODUCTION

Consumers are increasingly turning to organically produced food. High quality, origin, and the benefits associated with the consumption of organic food represent its additional values obtained by complying with the environmentally friendly production standards and principles and ensuring food security. This is a particular distinctive feature, attracting a growing number of consumers, as well as an interesting option in the form of food security affecting human health positively and directly [Shan 2006, Pilarski 2008, Lima et al. 2009]. Therefore, the development of organic farming is important to maintain a clean environment and good human health (Augustyńska-Prejsnar and Lechowska 2007, Zanolli et al. 2012). The newest literature references on the properties of organic food

show its better nutritional quality compared to conventional food. According to the latest published paper based on the meta-analysis [Barański et al. 2014], the concentration of antioxidants, such as polyphenols, was about 18-69% higher in organically grown plants as compared to the conventional ones. Numerous studies point out a relation between increased consumption of antioxidants and a reduced risk of chronic diseases, including cardiovascular and neurodegenerative diseases or certain cancers.

Significantly lower concentrations of cadmium (on average by 48%), belonging to toxic heavy metals, were also found in the raw materials from organic farming. The concentration of nitrogen compounds turned out to be significantly lower in organic plants, i.e. total

nitrogen concentration – by 10%, nitrates – by 30%, and nitrites – by 87% as compared to conventional plants. The studies have also shown that the probability of detection of pesticide residues was four times higher in conventional plants than in the organic ones (Barański et al. 2014, Brandt et al. 2011) demonstrated previously that intensive mineral fertilization of the crop, and thus the increased nitrogen availability in the plants results in the lower content of defensive secondary metabolites and vitamin C as well as increased levels of the compounds such as carotenoids. Regular consumption of such over-fertilised plants may cause the increase in the incidence of cancer and cardiovascular diseases. The increased content of dry matter, minerals, vitamin C, phenolic compounds, essential amino acids, total sugars, and the reduced content of nitrates and pesticides in organic food were also proved by Rembiałkowska [2007], Lairon [2010] and Lima and Vianello [2011]. It also contains more flavonoids (quercetin) and anthocyanins (delphinidin), as demonstrated by the study on red onion [Hallman and Rembiałkowska 2007]. Furthermore, according to Palupi et al. [2012], organic dairy products have a much higher content of protein, ALA, omega-3 fatty acids, conjugated linoleic acid, vaccenic acid, eicosapentaenoic and docosapentaenoic acids than the conventional ones. It has also been recorded that organic dairy products contain significantly more omega-3 fatty acids in relation to omega-6 fatty acids as compared to conventional products. According to Grela and Kowalczyk [2009], organic pig farming affects more favourably the profile of fatty acids in meat and cold meats as compared to the products obtained from conventionally bred animals. Other studies have focused on determining the effects of the age of laying hens on the quality properties of the eggs from native hens Zielononózka kuropatwiana (Z-11) from organic farming. The quality of eggs from the hens at the age of 36, 50 and 80 weeks was studied. It was found that egg and yolk weight increases as hens get older, i.e. the yolk part is larger while the egg white is reduced. The older

hens, the greater intensity of the colour of egg yolk as well as the higher content of vitamins A and E than in yolks from younger hens. The shells of eggs of older hens had better physical characteristics, pointing to their good quality. There were no differences in the profile of fatty acids in egg yolks in terms of age (Sokołowicz et al. 2012).

High and confirmed quality of organic products translates into increasing consumption. According to the survey by Gutkowska and Ozimek 2005, while purchasing food products consumers are primarily guided by the price, as well as the habit and ease of cooking, then by the nutritional value, the lack of preservatives and chemical additives, brand, the Polish origin of the product, low calorie content, and the lack or low level of sugar. To a small extent they are interested in organic food production and a low degree of processing. Krasnowska and Salejda [2011] acknowledged that consumers read more frequently and better understand the labels on the packaging. The growing interest in the label contents may be associated with the increasing care for health and well-being as well as diet which affects them. According to Gulbicka [2008], up to 64% of respondents associate food security with the organic origin. Consumers are keenly interested in food issues and would like to see the nutritional information on the packaging of the products.

Consumers associate organic food with health and – to a lesser extent – environmental protection (Mackiewicz-Walczak 2006). The organic production method is also characteristic of good quality and healthy products (Czernyszewicz 2011). The research by Burger [2000] shows that about 80% of respondents would like to buy environmentally friendly products. In addition, there are a growing number of people who prefer a healthy lifestyle manifested, inter alia, by the increase in the consumption of organic products.

#### **Hypotheses and research objective**

The study hypothesized that consumers of organic food should have – according to their judgments – a better diet than conventional consumers.

The aim of the study was to verify the hypotheses described.

## 2. MATERIAL AND METHODS

Survey research was carried out among the Warsaw consumers in 2009-2010. The respondents consisted of a group of randomly selected adult women and men aged 26-55. The average age for conventional women was 35.5, for organic women – 38.5, for conventional men – 43.9, and for organic men – 43.6. Each group comprised of 200 women and 200 men. The final number of respondents was established before the study which lasted until having obtained a predetermined amount of correctly completed questionnaires. Conventional food consumers were surveyed in supermarkets, while the organic ones – in organic food stores. The respondents answered the questions from the interviewer who was filling in a questionnaire.

Then they were classified into the following groups: people consuming organic food ('organic consumers') and those consuming the food produced with the use of intensive methods ('conventional consumers'). A respondent was classified as an organic consumer if in his/her diet at least 25% of the total amount of food came from organic farms and he/she had consumed such food for at least half a year.

The survey research consisted of personal information (age, marital status, education, major employment, the average monthly income per person, subjective assessment of the financial condition, the number of people in a household and the number of children under 18, the proportion and period of organic food consumption) and the subject area allowing the assessment of the diets of consumers. The questions were closed or semi-open (10 questions). They included the following issues related to the eating habits of the respondents (see: Annex): the number of meals and their regularity, breakfasts' consumption, and the frequency of consumption of various food groups (13 groups). The questions also

concerned some important issues about the appropriateness of food rations composed in terms of nutritional value, the atmosphere accompanying the consumption of food, the amount of consumed drinks, paying attention to the information on the label, eating between meals and the frequency of fast food consumption.

The study results were developed using the so-called quantification method. The answers to individual questions about diet were assigned to an appropriate score from 0 to 3 or 4 (see: Annex). A diversified score is the result of more or less positive characteristics of an answer in respect of a more appropriate diet. The more favourable answer in terms of quality, the greater number of points was assigned. A method of evaluating the quality of responses was introduced after consultation with a dietician. After adding up the points for each respondent and calculating the mean for the whole group, there was determined a diet evaluation index (max = 54 points), later called as diet.

An analysis of the obtained results was conducted using the one-way ANOVA analysis and the Statistica 9 software. There were received basic statistics; the significance of differences between the results for  $p\text{-value} = \alpha < 0,05$  as well as the impact of the studied factors on the tested quality characteristics were examined.

## 3. RESULTS AND DISCUSSION

Table 1 presents the analysis of the significance of differences in diets between organic and conventional groups of the consumers surveyed with regard to sex as an additionally diversifying factor.

There were recorded significant differences in diets between the studied indicators for the groups. The biggest differences were mainly noted between the obtained results for the organic men and women – the diets of women seem to be much better (mean for women = 36.2, mean for men = 32.9).

**Table 1. The significance of differences between the groups of conventional and organic men and women for the diet indicator (the Anova analysis).**

Indicator (n-number of respondents)	Group 1 vs. Group 2 (W-women, M-men, O-organic, C-conventional)	Indicator mean value for group 1	Indicator mean value for group 2	Level of the results significance ( $p < \alpha = 0.05$ )
Diet (n=200)	M C vs. M O	33.70 ± 4.78 <sup>a</sup>	32.90 ± 4.91 <sup>a</sup>	0.411
	M C vs. W C	33.70 ± 4.78 <sup>a</sup>	35.62 ± 5.97 <sup>a</sup>	0.079
	M C vs. W O	33.70 ± 4.78 <sup>a</sup>	36.20 ± 5.47 <sup>b</sup>	0.017
	M O vs. W C	32.90 ± 4.91 <sup>a</sup>	35.62 ± 5.97 <sup>b</sup>	0.015
	M O vs. W O	32.90 ± 4.91 <sup>a</sup>	36.20 ± 5.47 <sup>b</sup>	0.002
	W O vs. W C	36.20 ± 5.47 <sup>a</sup>	35.62 ± 5.97 <sup>a</sup>	0.614

<sup>a, b</sup> – the significance of differences between the results; two same letters indicate no significant differences

**Table 2. The significance of differences between the groups of conventional and organic respondents without sex distinction for the diet indicator (the Anova analysis).**

Indicator (n-number of respondents)	Group 1 vs. Group 2	Indicator mean value for group 1	Indicator mean value for group 2	Level of the results significance ( $p < \alpha = 0.05$ )
Diet (n=200)	organic vs. conventional	35.9 ± 5.70 <sup>a</sup>	33.30 ± 4.84 <sup>b</sup>	0.001

<sup>a, b</sup> – the significance of differences between the results; two same letters indicate no significant differences

**Table 3. Assessment of the impact of various factors on the quality of the respondent's diet (n=200)**

Quality factor	One-way analysis of variance ANOVA (significance level $p < \alpha = 0.05$ )
Sex	0.887
Age	0.284
Marital status	0.652
Education	0.030
Financial condition	0.317
Income per person	0.473
Number of persons in a household	0.579
Children under 18	0.003
Type of food consumed (organic/conventional)	0.0006
Proportion of organic food in diet	0.003
Period of organic food consumption	0.006

In addition, when comparing the organic men with the conventional women and the conventional men with the organic women, the organic men come off worst (the lowest mean and significant differences between the groups,  $p = 0.015$  and  $p = 0.017$ ). The conventional women had healthier diets than the conventional men, though no significant differences between the groups were found ( $p = 0.079$ ). Other results for the groups showed no differences. Then the results for the group of conventional and organic consumers, without sex distinction, were compared (Table 2). There were demonstrated statistically significant differences in diets ( $p=0.001$ ). In

this case, organic food consumers come off better. Due to the above analysis which proved that a diet is a characteristic differentiating the group of organic and conventional consumers, the quality properties that have a differentiating impact on this indicator were analysed and the results were presented in Table 3. It was estimated that the largest (significant) impact on the diet have: the type of food consumed – conventional/organic food ( $p=0.0006$ ); proportion of organic food in diet ( $p=0.001-0.005$ ); the period of organic food consumption ( $p=0.006$ ); the number of children under 18 ( $p=0.003$ ) and education ( $p=0.03$ ).

## Annex

Questions from the questionnaire and quantification of responses

No.	Question	Possible answers	Assigned points
1	How many meals do you eat daily?	1 to 2	0
		3	1
		4	2
		5 and more	3
2	Do you begin your day with a breakfast?	yes	1
		no	0
3	Do you eat regularly?	yes	1
		no	0
4	How often do you consume:	-	-
		not at all	0
4.1	milk	less than 1x a week	1
		more than 1x a week	2
		almost every day	2
		not at all	0
4.2	white cheese	less than 1x a week	1
		more than 1x a week	2
		almost every day	3
4.3	hard cheese	not at all	0
		less than 1x a week	2
		more than 1x a week	2
		almost every day	1
4.4	yoghurt	not at all	0
		less than 1x a week	1
		more than 1x a week	2
		almost every day	3
4.5	eggs	not at all	0
		less than 1x a week	2
		more than 1x a week	3
		almost every day	1
4.6	legume seeds	not at all	0
		less than 1x a week	1
		more than 1x a week	3
		almost every day	3
4.7	beef or pork meat	not at all	0
		less than 1x a week	2
		more than 1x a week	3
		almost every day	1
4.8	fishes or poultry	not at all	0
		less than 1x a week	1
		more than 1x a week	2
		almost every day	3
4.9	dark bread	not at all	0
		less than 1x a week	1
		more than 1x a week	2
		almost every day	3
4.10	rice, cereals, pasta, potatoes	not at all	0

		less than 1x a week	1
		more than 1x a week	2
		almost every day	3
		not at all	0
4.11	fruit or fruit juices	less than 1x a week	1
		more than 1x a week	2
		almost every day	3
		not at all	0
4.12	vegetables	less than 1x a week	1
		more than 1x a week	2
		almost every day	3
		not at all	3
4.13	sweets	less than 1x a week	3
		more than 1x a week	2
		almost every day	0
5	Do you think that your meals are properly formulated in terms of quantity and quality of nutrients?	probably yes	2
		probably no	0
		don't know	1
6	The atmosphere accompanying your meals is usually:	calm	1
		stressful	0
7	How much do you drink daily?	< 3 glasses	0
		3 to 5 glasses	1
		> 5 glasses	2
8	Do you pay attention to the amount and type of additives contained in the products you purchase?	yes	1
		no	0
9	Does it happen that you eat unhealthy food between meals?	yes, but occasionally	1
		yes, every day	0
		no	2
		every day	0
10	Do you visit 'fast-food' restaurants?	1x a week	1
		2-3x a week	2
		once a month	3
		never	4
		Maximum score	54

Other factors, such as sex, age, marital status, income or the number of persons in a household, did not affect significantly the diets of the respondents surveyed (did not differentiate the obtained results).

The conducted studies point out a relatively high nutrition awareness of organic food consumers. Gutkowska and Osóbka [2007] declare that consumers are generally aware of the increased health benefits of the products

from organic farming. They regard them as a source of nutrients and observe their effects on well-being. They emphasize the fact that while purchasing such food, they are guided, inter alia, by the care about their health and the health of their family and friends. That would explain the results presented in this paper – organic food consumers arrange their daily menu better, as they are aware of the significant impact of nutrition on health.

Furthermore, Pino et al. [2012] stated that the consumers who purchase organic food regularly pay more attention to its ethical aspects than those who buy it from time to time, paying attention to the safety of such food.

Shan [2006] shows that organic food is bought by the people who can afford it, but also by those having knowledge of modern methods of growing and food processing, the environment which they live in, and the nutritional and health properties of food. The own studies have shown no impact of income on diets of consumers, which may indicate an attempt to implement good eating habits and consumption of organic food also in less affluent households, but those which can afford to purchase such food in smaller quantities. Similarly, Storstad and Bjørkhaug [2003] showed no relation between the consumption of organic food and income, as well as the consumer's residence (town or village). The studies by Lockie et al. [2004] demonstrated a minor impact of education, age or income on choosing organic food, which is largely associated with the assessed appropriateness of diet. In other studies, it has been found that most often the consumers of organic food are also families with children under 18, even if their financial condition is not so good. This is confirmed by the studies carried out. The purchase of organic food is declared – to a greater extent – by people with higher and secondary education, and high professional position (Tyburski and Żakowska-Biemans 2007). Similar results have been obtained in the own studies, as the education had a significant impact on the diet of the respondents.

#### 4. CONCLUSIONS

The studies have shown that organic consumers have a better diet than the conventional ones. It was also demonstrated that education, the number of children under 18, proportion of organic food in consumers' diet and the period of its consumption are the factors that differentiate the consumers in terms of nutrition.

#### 5. ACKNOWLEDGEMENTS

We would like to thank Mrs. Agata Snopek, Mrs. Emilia Olkowska and Mrs. Małgorzata Woźniel for assistance in realization of this study.

#### 6. REFERENCES

- [1] Shan Y., 2006. Going organic – is it nutritionally better? *Primary Health Care*, 16/3/4, 37-40.
- [2] Pilarski S., 2008. Market organization and selected marketing activities in sales of organic food in Germany. *Scientific Papers of the High Economic and Social School in Ostrołęka*, Issue No. 6, 167-185.
- [3] Lima G.P.P., Lopes T.d.V.C., Rossetto M.R.M., Vianello F., 2009. Nutritional composition, phenolic compounds, nitrate content in eatable vegetables obtained by conventional and certified organic grown culture subject to thermal treatment. *International Journal of Food Science and Technology*, 44, 1118-1124.
- [4] Augustyńska-Prejsnar A., Lechowska J., 2007. Organic farming as a production system that guarantees the high quality of food products. *Rzeszów University Publishing House*, 480-488.
- [5] Zanolli R., Gambelli D., Vairo D., 2012. Scenario of organic food market in Europe. *Food Policy*, 37, 41-57.
- [6] Barański M., Średnicka-Tober D., Volakakis N., Seal C., Roy Sanderson R., Stewart G.B., Benbrook C., Biavati B., Markellou E., Giotis C., Gromadzka-Ostrowska J., Rembiałkowska E., Skwarło-Sońta K., Tahvonen R., Janovska D., Niggli U., Philippe Nicot P., Leifert C., 2014. Higher antioxidant concentrations, and less cadmium and pesticide residues, in organically grown crops: a systematic literature review and meta-analysis. *British Journal of Nutrition*, DOI:10.1017/S0007114514001366.
- [7] Brandt K., Leifert C., Sanderson R., Seal C.J., 2011. Agroecosystem Management and Nutritional Quality of Plant Foods: The Case of Organic Fruits and Vegetables, *Critical Reviews In Plant Sciences*, Vol. 30, No 1–2, 177-193.
- [8] Rembiałkowska E., 2007. Quality of plant products from organic agriculture, *J Sci Food Agric*, 87, 2757–2762.
- [9] Lairon D., 2010. Nutritional Quality and Safety of Organic Food, [in:] Lichtfouse E. et al. (eds.). 2010. *Sustainable Agriculture*, Vol. 2, 99-111.
- [10] Lima G.P.P., Vianello F., 2011. Review on the main differences between organic and conventional plant-based foods, *International Journal of Food Science and Technology*, 46, 1–13.

- [11] Hallmann E., Rembiałkowska E., 2007. The Content of Selected Nutrients in Red Onion Varieties from Organic and Conventional Farming. *FOOD. Science. Technology. Quality*, 2 (51), 105-111.
- [12] Palupi E., Jayanegara A., Ploegera A., Kahl J., 2012. Comparison of nutritional quality between conventional and organic dairy products: a meta-analysis, *J Sci Food Agric*, 1-8.
- [13] Grella E.R., Kowalczyk E., 2009. Nutrient Content and Fatty Acid Profile of Meat and the Selected Cold Meats from Organic Pig Production. *FOOD. Science. Technology. Quality*, 2009, 4 (65), 34-40.
- [14] Sokołowicz Z., Krawczyk J., Herbut E., 2012. The Quality of Organic Eggs in the First and Second Year of the Use of Laying Hens. *FOOD. Science. Technology. Quality*, 4 (83), 185-94.
- [15] Gutkowska K., Ozimek I., 2005. Selected aspects of consumer behaviours in the food market – the criteria for differentiation. SGGW Publishing House, Warsaw.
- [16] Krasnowska G., Salejda A.M., 2011. The Assessment of Consumers' Knowledge on Food Labelling. *Food. Science. Technology. Quality*, 1 (74), 173-189.
- [17] Gulbicka B., 2008. Bezpieczna żywność – opinie polskich konsumentów, *Biuletyn Informacyjny Agencja Rynku Rolnego*, 10 (208), 16-22.
- [18] Mackiewicz-Walczak I., 2006. Consumers' purchasing behaviours in the organic food market in the light of field research – the factors influencing the purchase of organic food in Poland, *Świat Marketingu (the Marketing World magazine)*, IV.
- [19] Czernyszewicz E., 2011. Jakość owoców w ocenie konsumentckiej, *ŻYWNOSĆ. Nauka. Technologia. Jakość*, 5 (78), 173-187.
- [20] Burger T., 2000. Environmental awareness of the Polish society on the threshold of the twentieth century, The Institute for Sustainable Development, Warsaw. [in:] Smoluk-Sikorska J., 2008. The Polish consumers and organic products. *Information Bulletin. Agricultural Market Agency (ARR)*, Warsaw 10, 23-25.
- [21] Gutkowska K., Osóbka G., 2007. Food as a source of benefits for the body in the opinion of consumers. *Human Nutrition and Metabolism: XXXIV*, 1(2), 300-304.
- [22] Pino G., Peluso A.M., Guido G., 2012. Determinants of regular and occasional consumers' intentions to buy organic food. *Journal of Consumer Affairs*, Spring, 46 (1), 157-169.
- [23] Storstad O., Bjørkhaug H., 2003. Foundations of production and consumption of organic food in Norway. *Agriculture and Human Values*, 20, 151-163.
- [24] Lockie S., Lyons K., Lawrence G., Grice J., 2004. Research report. Choosing organics: a path analysis of factors underlying the selection of organic food among Australian consumers. *Appetite*, 43, 135-146.
- [25] Tyburski J., Żakowska-Biemans S., 2007. Introduction to organic farming. SGGW Publishing House, Warsaw.