

Article

Organic Foods in Diets of Patients with Alzheimer's Disease

Szymon Dziuba ^{1,*}, Anna Cierniak-Emerych ¹, Blanka Klímová ², Petra Poulová ³, Piotr Napora ⁴ and Sylwia Szromba ⁴

¹ Department of Labour, Capital and Innovation, Wrocław University of Economics and Business, Komandorska 118/120, 53-345 Wrocław, Poland; aemerych@wp.pl

² Department of Applied Linguistics, Faculty of Informatics and Management, University of Hradec Králové, Hradecká 1249/6, 500 03 Hradec Králové, Czech Republic; blanka.klimova@uhk.cz

³ Department of Informatics and Quantitative Methods, Faculty of Informatics and Management, University of Hradec, Králové, Hradecká 1249/6, 500 03 Hradec Králové, Czech Republic; petra.poulova@uhk.cz

⁴ NZOZ Center of Clinical Research, Długosza 4, 51-162 Wrocław, Poland; napora.piotr@cbk.wroc.pl (P.N.), szromba.sylwia@cbk.wroc.pl (S.S.)

* Correspondence: szymon.dziuba@ue.wroc.pl

Received: 20 December 2019; Accepted: 12 February 2020; Published: 13 February 2020

Abstract: Sustainable consumption is increasingly being promoted in the face of the decreasing amount of natural resources in the world. In general, sustainable consumption means using products and services that meet human basic needs while minimizing the consumption of natural resources and reducing waste. At this point, it is worth noting that the production of organic foods is conducive to the development of sustainable consumption through, e.g., natural methods of production, without the use of artificial fertilizers and crop protection chemicals. Nowadays, more and more emphasis is put on the correlations between health and diets. Consumers who care for their health often choose organic food. Therefore, the focus of this study was on the identification and presentation of the interest in organic foods among people who provide care to patients with Alzheimer's disease. In order to achieve this aim, the theoretical part of the study attempted to demonstrate, on the one hand, the benefits of organic food and, on the other hand, the specific nutrition of patients with Alzheimer's disease. The achievement of the study aim was supported by the analysis of the related literature, including the results obtained by other authors. The results of the authors' own survey conducted in 2017–2018 were also used, with the respondents being the carers and potential carers of patients with Alzheimer's disease and medical specialists. A statistical analysis was also carried out, including Pearson's test analysis and a correspondence analysis. The literature survey and empirical examinations led to the conclusion that organic food is characterized by health benefits which should be taken into consideration during planning of diets for patients with Alzheimer's disease. Carers indicated the deficiency of knowledge concerning demanded diet components. They intuitively perceive the need for using organic food due to its health benefits and for the implementation of the principles of sustainable consumption. Carers are unable to identify the values which would help improve the health of patients with Alzheimer's disease.

Keywords: organic food; Alzheimer's disease; ecology; healthfulness; nutrition; health benefits; diet; health; carer

1. Introduction

1.1. Organic Food as the Subject of Research

Healthy lifestyles have been attracting increasing attention in developing countries. This is supported by various educational programs, also with global or European character, including those financed from the EU funds [1]. In this context, it is worth emphasizing that a specific role in the promotion of healthy lifestyles is played by popularization of consumed foods. People who are concerned not only with satiety but also with health pay much attention to what they eat [2].

Therefore, consumers emphasize more and more often that food products should not only improve the general health status of the person but also contribute to the prevention of risks of various diseases, including more and more prevalent diseases of the alimentary or cardiovascular systems. These needs are attempted to be met by various behaviors of both researchers and food companies [3–5]. Food is becoming a topic of increasingly extensive studies which are aimed to improve and modify food products to meet the above challenges. Such initiatives result, for example, in the development of research, the presentation of the results that demonstrate health benefits and, consequently, to the increased interest of both consumers and producers in organic food [6,7].

After an initial review of the literature indexed in the Web of Science databases (WoS and Scopus), if this term is used to search for the titles, 696 (Web of Science—WoS) and 976 (Scopus) results are obtained. These results do not add up; the title collections in both databases overlap in general, but in order not to omit valuable publications indexed in only one of them, it is necessary to analyze both sets of results.

Table 1 shows the most cited publications on organic food, taking into account their examples, the context in which organic food is considered, and the number of citations in the WoS and Scopus databases.

Table 1. The most cited publications on organic food.

| Examples of the Most Cited Publications Referring to Organic Food/Context in which They Deal with Organic Food | WoS | Scopus |
|---|------------|---------------|
| Padel, Foster 2005/purchasing organic food | 369 | 431 |
| Magnusson, Arvola, Hursti, Åberg, Sjöden 2003/dependence of the choice of organic food on the perception of health and environmental issues | - | 386 |
| Zanoli, Naspetti 2002 / motivation of consumers during purchasing organic food | - | 347 |
| Aersens, Verbeke, Mondelaers, et al. 2009/personal determinants of decisions on organic food consumption | 342 | 391 |
| Seyfang 2006/Ecological citizenship and sustainable consumption | 287 | 349 |
| Schifferstein, Ophuis 1998/health aspects of organic food consumption | 263 | - |

Source: [8–13].

Such results should emphasize the issues related to consumer attitudes, health concerns and environmental problems, whereas the problems of ecological citizenship and sustainable consumption seem to be particularly interesting in contemporary reality. Such statements seem to be justified, in particular, in the contemporary realities of life and functioning of economic organizations when more and more often, sustainability becomes the subject of scientific explorations. According to the definition of the Brundtland Commission, sustainable development is development which meets the needs of current generations without compromising the ability of future generations to meet their own needs. In other words, sustainable development means striving to ensure sufficiently high ecological, economic and socio-cultural standards within the limits of nature's tolerance for all people and future generations by implementing the principle of justice within and between the generations.

As a result, a criterion for selecting publications was added to the previous search for scientific papers in terms of the presence of the term sustainability in the title, abstract or keywords. This yielded 53 and 61 results for WOS and Scopus, respectively. The most frequently quoted publications (chosen in a manner similar to that used in the previous more general search) refer to the above-

mentioned publication on ecological citizenship and sustainable consumption. Furthermore, Table 2 also points to a different context for considering organic food using the term 'sustainability'.

Table 2. The most frequently cited publications on organic food, including the term “sustainability”.

| Examples of the most Frequently Cited Publications Referring to Organic Food, including the Term “Sustainability”/Context in which They Deal with Organic Food | WoS | Scopus |
|---|------------|---------------|
| Smith-Spangler, Brandeau, Hunter, G.E., (...), Olkin, I., Bravata, D.M. 2012/greater safety of organic food compared to conventional food with regard to health | - | 245 |
| Thøgersen 2010/international differences in consumption of organic food | 114 | 126 |
| Clarke, Cloke, Barnett, et al. 2008 / space and ethics in the context of organic food | 51 | 69 |
| Jolink, Niesten 2015 /sustainability and business model of enterprises from the organic food sector | 37 | - |
| Stagl 2002/potential and limitations of local organic food markets in supporting sustainability | - | 60 |
| Aschemann-Witzel, Zielke 2017/review of consumers’ perception and behaviour in relation to the prices of organic food | 36 | - |
| Poulston, Yiu 2011 /determinants of the presence of organic foods in restaurant menus | 35 | - |

Sources: [14–20].

The above analyses confirm the assumption that organic food is becoming increasingly important in the context of considerations related to the broadly understood concept of sustainable development (see Tables 1 and 2). At the same time, this sustainable development is linked to both sustainable consumption [21,22] and social aspects, such as the health aspects of the organic food consumption mentioned above and, in this context, the use of organic food in diets, including the diets of people suffering from various diseases.

The authors of the present paper considered the possibility of using organic food in the diets of people suffering from various diseases to be particularly important from the perspective of the considerations conducted in this paper.

Bearing the above in mind, referring to the literature on the subject and narrowing down the search by using the words “food”, “diet” and “Alzheimer” in the title, abstract and keywords yields four (WoS) and six (Scopus) results, respectively. For example, the most cited paper refers to a diet that protects against diseases [23]—180 citations in WoS and 207 citations in Scopus. The above method allows not only for optimal searching for the most relevant publications on a given topic (with simultaneous emphasis on the key element of “food”), but also for identification of the research gap that may be filled in by further research.

While conducting the search, it was considered worth analyzing the list of publications which, with the use of appropriate search criteria, can be regarded as the closest to the individual issues searched for. These concern the links between the food supply system, health promotion and sustainability [24]; sustainable systems and strategies for ensuring food in cities [25]; methodological approach to the relationships between sustainable food production system and eating a Mediterranean diet [26]; analysis of a healthy and balanced school child nutrition program based on fruit and vegetables [27]; links between lifestyles and health and the balanced and healthy eating choices of seniors [28]; sustainable nutrition education as a pathway to healthy eating [29].

The growing world population and the related challenges concerning nutrition and also environmental pollution as a consequence of social and economic development, have a substantial effect on human health. In addition to cancers and diseases related to modern life, Alzheimer’s disease is becoming one of the most common problems that have to be addressed. In this context, in the opinion of the authors of the present paper, it is particularly desirable to undertake broader investigations on the rationale and barriers to the diets of people with Alzheimer’s disease associated with the sustainable consumption of organic foods.

1.2. Organic Food: Concept and Manufacturing

The definition by the Food Code published by the Food and Agriculture Organization/ World Health Organization (FAO/WHO) says that organic foods are the foods produced by farms that use organic systems harmonized with the environment [30]. Furthermore, the foods are produced based on the principles required to be followed in order to be awarded special trademarks by organic farming organizations. Specific prerequisites contained in the Basic Standards for Organic Production and Processing according to the International Federation of Organic Agriculture Movements (IFOAM) have to be met by a product to be considered organic [31]. The document contains the principles of production, processing, storage, labelling and placement in the market of foods [31]. In the English literature, food that meets the above criteria is termed organic food [31]. Although the guidelines of the Commission of the European Communities and, more specifically, the Regulation of the Commission of the European Communities, define organic food, they also specify when food products can be marked as organic [32]. This occurs only if a product is characterized by at least 95% of ingredients obtained using organic methods or entirely “clean” (organic raw materials) [33].

Furthermore, organic foods should have at least 70% of these components, whereas 30% of the components of agricultural origin should be accepted for processing using organic methods. As shown in the literature, food can be divided into three categories according to the content of organic components [34], which also determines using or not using the term ‘organic’ with respect to a food product. This concerns the following categories [34]:

- Category I: amounts of organic ingredients of over 95%; only these products can be labelled as organic and regarded as organic products,
- Category II: amounts of organic ingredients range from 50 to 95%, with these products termed partially organic,
- Category III: content of organic ingredients below 50%; these products are not qualified as organic and are termed non-organic.

Organic food does not only mean agricultural products in the form of cereals, vegetables and fruit but also meat, animal fats, milk and dairy products, fish, vegetable fats, seasonings and herbs, juices and non-alcoholic drinks and even alcohols made of raw materials from organic crops [35].

Therefore, particular attention should be paid to the principles of organic food production and management of organic food production, which can be defined as an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity [36]. It is relatively often indicated that this food characterizes the manufacturing method consistent with the principles contained in the community regulation which was discussed above. The manufacturing method means, among other things, the production of interesting foods without the use of artificial fertilizers and chemical crop protection agents while maintaining soil fertility and biological diversity [37].

Organic food producers are therefore obliged to produce this food from organic agricultural compounds. It is recommended to reduce the amount of food additives, auxiliary substances, and non-organic microelements and ingredients which perform sensory and technological functions. Their use is possible only in the situation of technological necessity or if a product is supposed to be used for special nutritional purposes. Organic food producers are obliged to carefully process foods using biological, physical and mechanical methods. It is forbidden to use GMOs and ionizing radiation to process foods or raw materials used as food ingredients [38,39]. It is also impermissible to use chemical crop protection agents, which should be replaced by natural solutions such as microorganisms from other life forms. Furthermore, antibiotics and veterinary drugs are not allowed [40].

Bearing in mind the above, organic food and its production fall within the scope of the investigations in the field of sustainable consumption.

Organic products can be recognized by their labels, with words ‘organic’, ‘eco’ or ‘bio’, the EU organic logo (Euro Leaf) and the certification authority number. Only these product markings provide the guarantee of its organic origins [41]. It is worth emphasizing that the term organic food

is often used interchangeably with healthy food. This is not always correct since organic food means certified products whereas healthy food has only a marketing undertone [31].

Organic foods are attracting more and more interest in the countries of the European Union. As shown by the data presented by the European Commission, global organic crops covered 37.5 million ha in 2012, of which 30% were located in Europe, with over 230,000 of organic farms [42]. Furthermore, a survey conducted in 2014 by the Institute of Organic Agriculture (FiBL) and the International Federation of Organic Agriculture Movements (IFOAM) showed that the area of organic crops accounted for 5.6% of the entire EU territory, whereas in other regions of the world, this percentage did not exceed 1% [43].

In 2012, Poland was among the leading countries of the European Union in terms of the number of organic farms and the area of agricultural land used for organic farming. However, in terms of the percentage of land for organic farming in the total agricultural land, Poland, compared to other EU countries, was below the average. With this background, Poland's immediate neighboring countries (Czech Republic and Slovakia) were much better [44]. Bearing this in mind, however, it is worth referring to the information contained in the report "Organic food in Poland 2017" prepared by IMAS International sp. z o.o. The report emphasized that: *"The market is in the growth phase, which is also forecast for the years to come, the industry is picking up, the barriers of product availability are being overcome, and the organic food products are reaching not only shelves of specialized shops but also local shops or supermarket. Consumers of organic foods are motivated for purchasing them, have substantial knowledge of organic foods and their effects on health"* [45].

As emphasized in the literature, organic food should be considered in light of four main principles, i.e., [46]:

- ecology (similar to ecosystems, connected with chemical cycling and energy flow in nature),
- fairness (using honest relations between producers and consumers),
- attentiveness (this concerns organic farms based on the responsibility for health and well-being of humans),
- general health (ensuring high nutritional and health values of food products).

Especially important is the last of the listed principles, which is connected with health values of the organic foods. Due to the lack of harmful residue of fertilizers and preservatives, exclusion of genetic modification and content of specific components, this food can be attractive for consumers who seek products other than medical in order to maintain or improve their health status [47–49].

1.3. Health Benefits of Organic Foods

The health benefits of organic foods have been more and more often emphasized in the literature, which results from increasingly frequent research studies in this field. Thus, organic food in comparison with conventional food is characterized as follows [50–52]:

- higher content of unsaturated fatty acids,
- beneficial ratio of omega-3 to omega-6 fatty acids,
- higher content of proteins,
- higher content of vitamins, including vitamin C, vitamin B,
- higher content of antioxidants,
- higher content of macronutrients and micronutrients,
- lower content of pollutants (pesticides, potentially toxic trace elements),
- lower content of nitrates.

A higher content of polyunsaturated fatty acids was confirmed, for example, in the examinations of pork from organic production [53]. In another study, an increased content of unsaturated fatty acids was found in linseed oil [54].

Furthermore, studies have also demonstrated that organic milk contains a higher level of omega-3 fatty acids and better ratio of omega-3 to omega-6, similarly to eggs of hens from organic farms [55,56].

It should be noted that the interest in health benefits of organic foods due to the content of unsaturated fatty acids and ratio of omega-3 to omega-6 fatty acids is caused, among other things, by the increasing number of diseases, such as obesity, arteriosclerosis, cardiovascular diseases and cancers. Humans consume excessive amounts of saturated fatty acids that contribute to the development of such conditions. The precondition of healthy diets is to consume foods which contain unsaturated fatty acids [57].

As it was demonstrated above, organic foods are characterized by a higher content of vitamins, including vitamin C and B-group vitamins. In this context, studies have shown that a higher content of vitamins, including vitamin C, is observed in organic foods, including cabbage, potatoes, whereas in fruit, the highest content is found in chokeberries. Aronia is characterized by the content of valuable components, such as dietary fiber, pectins, vitamins (not only vitamin C but also B-group vitamins) and micronutrients such as manganese and copper [58]. It is known that vitamins, including vitamin C and B, meet important protective functions while ensuring the proper functioning of the immune system and inhibiting carcinogenic changes, etc. Therefore, beneficial amounts of these nutrients can be conducive to balanced diets and consequently, improved health.

Studies have also shown that organic foods contain more mineral compounds compared to conventional foods, e.g., [59]:

- iron (cherries, blackcurrant, spinach),
- magnesium (carrot, potatoes, savoy cabbage),
- phosphorus (potatoes, leek, lettuce, spinach, cherries),
- potassium (carrot, potatoes, spinach).

Thus, organic foods have many health benefits. Undoubtedly, eating organic foods can be considered one of the important methods to provide body with healthy products without artificial additives, which should be conducive to the increased immunity in people who use them in their diets. The body of a person who follows such diets is less prone to fatigue and less sensitive to the increased load to the nervous system [60]. The researchers from the Karolinska Institute in Stockholm confirmed the hypothesis that lifestyles have a dominant effect on human health [61]. Most chronic and incurable diseases are of a genetic origin. There can be a congenital tendency to have cancers, hypertension, diabetes, mental diseases and Alzheimer's disease. However, it should be emphasized that the etiology of the diseases of affluence, also those mentioned above, such as Alzheimer's disease, can be linked to unhealthy diets, including the lack of intake of healthy nutrients. Furthermore, diets for patients can be enhanced by the use of organic foods rich in essential components, including conventional illnesses. In this context, the particular focus was on Alzheimer's disease and the related dietary problems.

1.4. Organic Foods in Diets of Patients with Alzheimer's Disease

Alzheimer's disease is one of dementias which begin at the age of 40 to 49, with its prevalence increasing with the age of patients and doubling every five years after the person is 65 years old. The disease is progressive and its duration ranges from 8 to 20 years. As the disease advances, patients can lose their abilities of communication, suffer from urinary incontinence and require round-the-clock care [62,63].

There are two leading theories of Alzheimer's disease causes: (1) the amyloid cascade hypothesis and (2) the vascular hypothesis. The first one sets the primary role for the accumulation of amyloid β and the second for cerebral hypoperfusion [64]. However, the current state of knowledge clearly shows that the cause of Alzheimer's disease is multifactorial, with both central and peripheral factors engaged [65].

Alzheimer's disease is becoming a serious issue of global public health. Several years ago, in 2001, the number of patients all over the world was 24 million and it is expected to double every two decades. In 2040, this number can even reach 81 million. Demographic tendencies show that an increase in the population of people over 65 years can be expected in this period, consequently leading to the increase in the number of cases of Alzheimer's disease [62,63].

Problems with the nutrition of people with Alzheimer's disease are connected firstly with the lack of patient cooperation, especially during more advanced stages of the disease. In practice, it is easier to introduce dietary interventions at initial stages of the disease when cooperation with the patient is usually complete and in terminal stages, when nasogastric intubation can be used for feeding. Another factor is psychotic symptoms, which often include problems such as fear of being poisoned, which results in acceptance of only already known meals and tastes and in the case of introducing any nutritional changes, rejection of people who feed patients and prepare foods. The third problem, increasing at consecutive stages of the disease, is physiological disorders of chewing, mastication and swallowing, forcing to introduce mixed, semi-liquid and ready-made food products [66,67].

Therefore, nutrition is a significant risk factor in Alzheimer's disease that can be modified [68]. Various tests and analyses have been performed to develop effective dietary interventions in this group of patients. Positive effects have also been found for specific holistic diets such as MIND (hybrid Mediterranean-Dietary Approaches to Stop Hypertension) [69], ketogenic diet [70], natural Mediterranean diet [71], complex supplements [68], individual factor such as omega-3 fatty acids, antioxidants, and B-group vitamins [71]. Especially interesting is the Mediterranean diet, which assumes the high consumption of vegetables and fruits, cereals and products with high content of unsaturated fatty acids. It should be emphasized that clinical studies have not provided unequivocal evidence concerning such procedures. The effects of food preparation methods on dietary interventions also remain unclear [71].

Furthermore, some researchers linked Alzheimer's disease to elevated levels of homocysteine, leading to damaging of nervous cells. Its concentration increases with deficiencies in B-group vitamins and folic acid contained in vegetables, fruit and bread [72].

Although the relationships between nutrition and prevention or slowing the development of Alzheimer's disease have not been established unequivocally, the investigations mentioned above lead to the assumption of the legitimacy of enriching diets with the above compounds in patients with Alzheimer's disease and consequently, products rich in these compounds. These conditions can be met by organic foods, providing health benefits to patients with Alzheimer's disease.

Nutrition of patients with Alzheimer's disease represents a major challenge to carers of such people. They have to choose dietary components, prepare them and often help people eat them. Therefore, the focus of this study was on the identification and demonstration of the interest in organic foods among people who provide care to patients with Alzheimer's disease.

Consequently, the aim of this study was to familiarize the reader with the knowledge of carers about the indications for and barriers to the use of organic foods in diets of people with Alzheimer's disease. In order to achieve this aim, the initial part of this study attempted to demonstrate, on the one hand, the benefits of organic foods and on the other hand, the specific nutrition of patients with Alzheimer's disease.

2. Materials and Methods

The research process was conducted according to the design presented in Figure 1. The research procedure included stages such as formulation of the research problem, definition of the study aim, choice of research methods, development of research tools, conducting empirical studies, analysis of the collected data and information, and drawing the conclusions. Bearing this in mind, the previous part of the paper contained the interpretation and critical assessment of the previous scientific output devoted to the analyzed issues. Consequently, the attempt was made to demonstrate, based on the findings of previous studies, what the health benefits of organic foods and what the reasons for using this food in diets of people with Alzheimer's disease are.

The next step was to conduct a diagnostic survey using a questionnaire designed by the authors of the present study, concerning the diagnosis of the knowledge of carers and potential carers of patients with Alzheimer's disease about the reasons and barriers to the use of organic foods in diets for such people.

Finally, the analysis of the data and information collected during empirical examinations was performed and the next section presents the findings and conclusions from these examinations.

The data presented in the text of the study were subjected to a statistical analysis. The analysis was carried out in the statistical environment R (ver. 3.5.3) using the FactoMineR (ver. 1.42) and tidyverse (ver. 1.2.1) packages. The R program allows for the creation and popularization of packages containing new functionalities. In the R program, it is possible to draw high-resolution charts, which is very important when presenting the results. Even with default settings, these charts are much better than similar charts prepared in other packages.

Taking into account the above, the research problem analyzed in this paper was formulated in the form of a question: Is it possible to identify the health values of organic food and the rationale and barriers to its use in the diets of people with Alzheimer's disease?

Three hypotheses were formulated based on the research problem:

H1. *The diets can prevent/restrict the development of Alzheimer's disease.*

H2. *Information about the diets of patients with Alzheimer's disease is sufficiently publicised in the mass media.*

H3. *Eating organic food is important in the diets of people with Alzheimer's disease.*

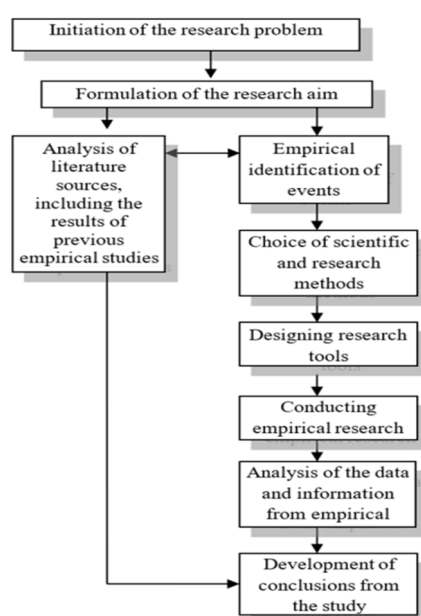


Figure 1. Research procedure used in the study (author's own study based on [73]).

Empirical research of carers and potential carers of people with Alzheimer's disease about the reasons and barriers to using organic food in diets of the patients were conducted in 2017–2018 using the method of a questionnaire survey. A questionnaire developed by the authors was used containing closed-ended questions with various options of possible answers and open-ended and semi-open-ended questions.

The survey was of anonymous and confidential character. The study group was comprised of 38 people, with 19 people being carers of patients with Alzheimer's disease. The research sample included all carers of patients with Alzheimer's disease from the Centre for Clinical Research. The carers of the patients gave their informed consent for participation in the study. It should be added that carers of people with Alzheimer's disease were mainly people aged 50 to 55 years, who, due to the nature of the disease and time and psychical pressures connected with caring for patients, do not always want to participate in such surveys. The other groups of respondents, potential carers, were

people who did not have such patients in families, but due to genetic reasons, were at risk of occurrence of such diseases in their families.

In total, there were 12 women and 7 men in the group of carers of patients with Alzheimer's disease. The majority of carers were people with tertiary education living in big cities. Furthermore, there were 11 men and 8 women in the group of potential carers. In this case, the respondents were mainly people with secondary education living in a big city.

Although the test sample was not big enough to draw general conclusions, interesting findings were made at the initial stage of the survey. They represented the basis for initial assessment of the correctness of the adopted assumptions and formulation of further research aims. It seems justified to continue explorations in the discussed area of research, which are planned by the authors of this study.

3. Results

The findings show that organic foods are characterized by specific health benefits which should be analyzed with respect to diets of people with Alzheimer's disease. Since it was adopted that planning diets and feeding patients with such products was mainly the responsibility of the carers of people with Alzheimer's disease, the knowledge of these people concerning both the disease and organic food (and its importance in diets) was found to be especially critical. Furthermore, the respondents were also people who did not have such patients in families, but, due to genetic reasons, were at risk of occurrence of such diseases in their families.

The results of empirical studies conducted among carers and potential carers of patients with Alzheimer's disease demonstrated that all the carers included in the study had very good knowledge of the disease and were able to identify its symptoms. It is worth mentioning that 78% of the potential carers included in the study also properly indicated the structure and symptoms of the disease.

With regards to the question whether the respondents were informed by the doctor or other people about the usefulness of specific diets for people with Alzheimer's disease, the carers mostly answered (89%) that they did not receive such information. Furthermore, the respondents claim that information about the diets of patients with Alzheimer's disease receives insufficient publicity in mass media. They expect more such information, not only on the Internet but also in, e.g., magazines which can be distributed in pharmacies. With regards to the results obtained among potential carers, all the respondents indicated the lack of information and knowledge about the need for using specific diets for patients. Furthermore, the respondents emphasized that although the disease is starting to affect more and more people, information, especially in mass media, remains to be insufficient, particularly concerning the methods of working with patients. They would be interested in such information since the disease can affect anyone, either them or their relatives. It is worth adding that the group of potential carers included people (22% of the respondents) who indicated that they had contacts with the disease among their friends.

In the age group of people aged 60 years and more, two-thirds of all respondents (62.5%) stated that there was no effect of healthy diets on preventing the development of Alzheimer's disease. In the remaining age groups, this answer was not found. The statistically significant correlation was confirmed by the Pearson's test ($p < 0.05$).

The responses in this respect were divided into those given by carers of the patients and potential carers, as presented below.

Carers of patients with Alzheimer's disease also indicated that in their opinion, diets cannot prevent from or slow down the development of the disease. This answer was provided by 63% of the respondents. However, 37% of the respondents were of the opinion that diets can have an effect on prevention or limitation of the disease. Different answers were obtained among the respondents who represented potential carers. In total, 62% of the respondents answered positively that diets can be critical to the prevention or limitation of the disease's progress.

Among products that should be consumed to prevent or limit the development of Alzheimer's disease, the carers of the patients enumerated green vegetables, goat milk, fruit and natural bread. They also indicated the effectiveness of limitation of fatty meals and sugars. Furthermore, potential

carers mentioned nuts, rabbit meat, fish, fruit and vegetables. They also indicated the legitimacy of using increased amount of polyunsaturated fatty acids.

With regards to the question of the products which were mostly liked by patients, these included fruit and vegetables, bread and meat. The respondents emphasized that patients were unwilling to consume dairy products. Going more into details of the products consumed by patients, the carers indicated that among fruit, the patients chose apples, bananas, tangerines and strawberries. The vegetables were carrots, beetroots, cabbage and celery. Bread products included white bread and dark bread whereas, in the case of meat, the patients preferred poultry and pork.

Taking into account the research hypotheses formulated above, a correspondence analysis was also used to analyze the research results, with its results graphically presented in Figure 2.

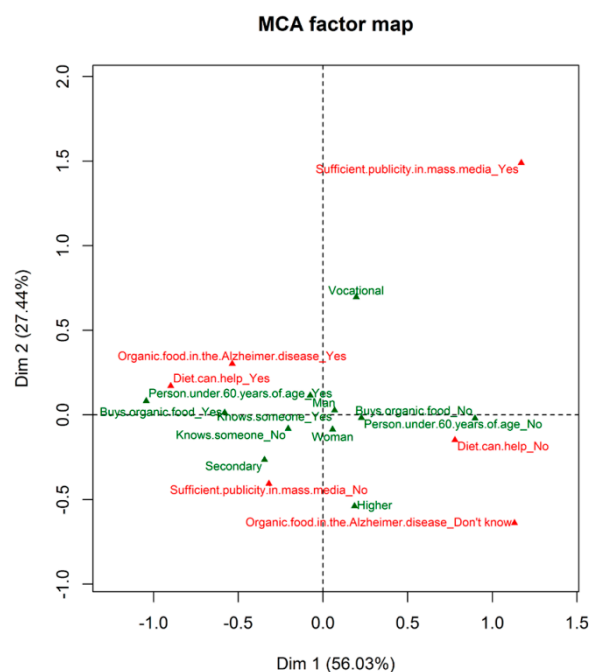


Figure 2. Correspondence analysis.

The correspondence analysis showed that the respondents (analyzed in total, i.e., carers and potential carers) represented by older adults, i.e., those over 60 years of age, are more likely to know someone with Alzheimer's disease while remaining more skeptical about the fact that diet can help treat this disease compared to people at a younger age. They are also more likely to lack knowledge about the benefits of using organic food in the diets of patients with Alzheimer's disease. Furthermore, these respondents, who are people with a secondary education, are more willing to buy organic food and are more convinced about the insufficient publicity of the diets of people with Alzheimer's disease in the mass media compared to other respondents.

As it has been indicated in the previous parts of this study, Alzheimer's disease is becoming a kind of disease of affluence. The number of patients is increasing and it is estimated that the number is going to rise even more. Furthermore, as also demonstrated above in the present study, the scientific literature presents the results of the examinations concerning the positive effects of the use of, e.g., a Mediterranean diet in people with Alzheimer's disease. In this context, it seems legitimate to promote knowledge in this field of science, especially the information about the importance of such elements of the patients' diets as omega-3 and omega-6 fatty acids, B-group vitamins and food products which contain these nutrients.

With direct reference to the opinions about the use of organic food in diets of patients with Alzheimer's disease, it is important that all carers of patients identified the term 'organic food' correctly. Furthermore, 63% of them found that it was important that diets of such patients should include organic foods. These data are interesting and even surprising, especially in the context of the presented indications concerning the opinions of the effectiveness of using diets dedicated to patients

with Alzheimer's disease. Nearly 37% of patients did not see the importance of the diets in the treatment of the disease.

In the group of potential carers, 87% of the respondents properly identified the term 'organic food'. Furthermore, 77% of potential respondents found that this food can be important in the diets of people with Alzheimer's disease, whereas 22% of the respondents did not have any opinion about this problem.

Figure 3 presents the reasons for using organic food in the diets for patients indicated by the respondents (carers).

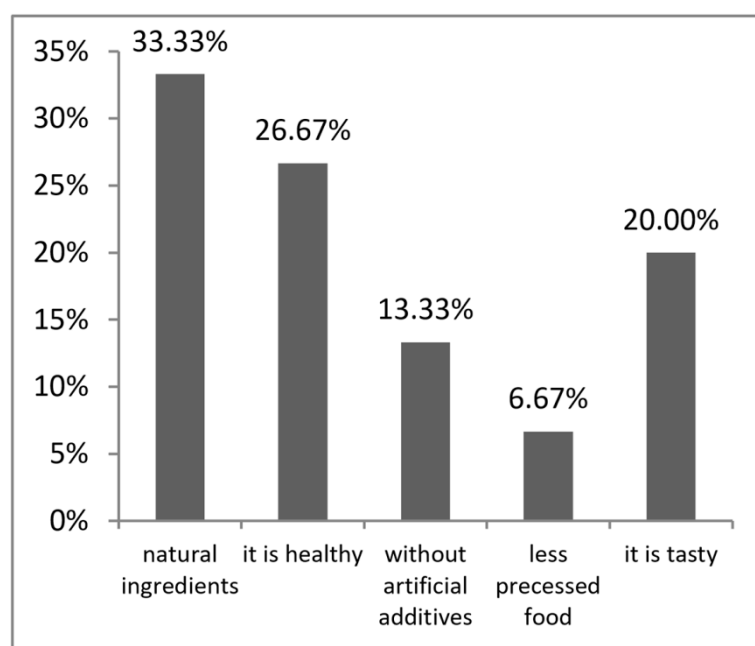


Figure 3. Reasons for using organic food in diets of patients with Alzheimer's disease according to carers of the patients (author's own elaboration based on the results obtained in the study).

As it is shown in Figure 3, there is a dominant view among the carers that organic food is worth consuming, thanks to its natural components (33% of answers), health benefits (25.67%) and being tasty (20%). Interestingly, only 13.33% of the indications concerned the lack of artificial additions in organic foods, whereas 6.67% of them concerned the values of this food connected with lower level of processing. Similarly to carers, there was a dominant view among potential carers that the values of organic food included first and foremost the content of natural components (42.86%), followed by the lack of artificial ingredients (28.57%) and being healthier (28.57%).

The carers of patients with Alzheimer's disease claimed that the diets of patients should be enriched, especially by organic products such as fruit, vegetables, dietary fiber, and unsaturated fats. Similar answers were obtained among the respondents from the group of potential carers.

The indications of the carers of patients with Alzheimer's disease suggest that these people could correctly define the term organic food. However, they did not have complete knowledge about the health benefits of this food. They claimed that organic food is healthy but they were unable to indicate concrete values. A similar situation was observed in the group of potential carers. Therefore, it seems justified to intensify initiatives towards popularization of knowledge about health benefits of individual organic products. This concerns especially the products which are rich in B-group vitamins, vitamin C and unsaturated fatty acids. It would be interesting to attempt to create a list of such products dedicated to patients with Alzheimer's disease, which requires, however, further in-depth studies in this field.

Interesting answers were provided by the respondents (carers) to the questions of whether they bought organic food, as presented in Figure 4.

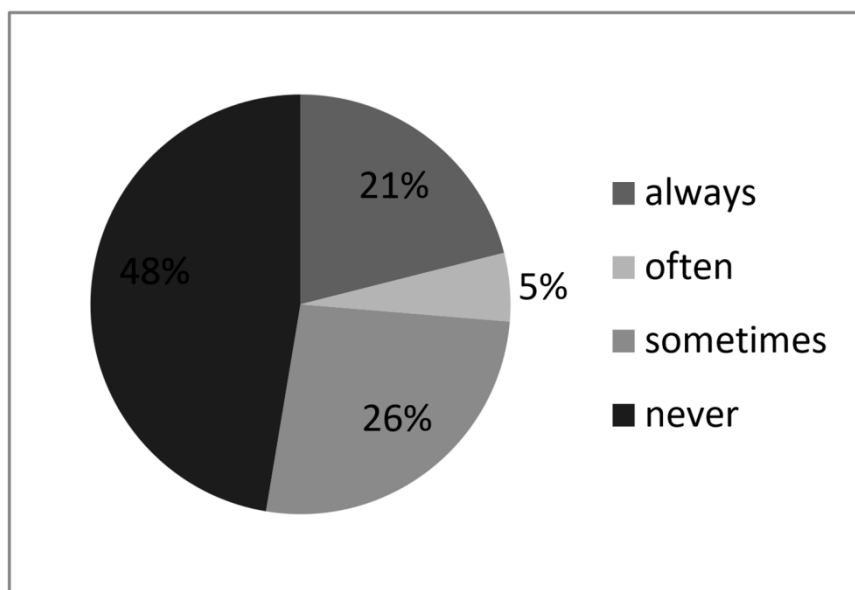


Figure 4. Frequency of purchasing organic food by carers of people with Alzheimer's disease (author's own elaboration based on the results obtained in the study).

As results from the information presented in Figure 4, 48% of the carers indicated that they had never bought such foods, whereas 21% of them always bought organic products. Frequent buying of organic food was found in 26% of carers of patients with Alzheimer's disease. In the case of potential carers, 34% of the respondents bought organic foods often, whereas 33% did it sometimes. Furthermore, 22% of them never bought such products.

With regards to the reasons of the limited interest or lack of interest in buying such foods, 71% of carers of patients with Alzheimer's disease claimed that this food was expensive. The remaining 29% of the respondents indicated that one of the limitations was the lack of knowledge about origins of such foods and their authenticity. Similar replies were found among the respondents who were potential carers. In this group, 67% indicated that organic food was too expensive, whereas 17% of the respondents found that knowledge about its origins and authenticity was insufficient. It is worth quoting the results of an empirical study presented in the literature, which showed that consumers of organic foods had to cope with dishonest producers who used the logo of organic food illegally [41]. This unpleasant experience represented one of the causes of indications provided by the carers and potential carers of patients with Alzheimer's disease. Interestingly, no respondent from both groups indicated that organic food is insufficiently available.

4. Conclusions

Empirical studies concerning the opinions of carers and potential carers of patients with Alzheimer's disease confirmed insufficient knowledge about the usefulness of diets dedicated to patients in the group of respondents analyzed in the study, which does not provide the basis for supporting hypothesis H1. It also seems, somehow intuitively, that the respondents sensed the usefulness of organic foods in nutrition of patients with Alzheimer's diseases as they emphasized health benefits of such foods, which, however, does not provide the basis for supporting the hypothesis H2. The results of empirical studies also do not support the hypothesis H2 that the dietary information for Alzheimer's disease patients is sufficiently publicized in the mass media.

The paper emphasized the concept and health values of organic food and the relationships between the opportunities for using this food in diets of patients with Alzheimer's disease. Based on the available literature sources, attention was especially paid to health values of organic food while emphasizing a higher content of unsaturated fatty acids compared to conventional foods, positive ratio of omega-3 to omega-6 fatty acids, content of certain vitamins (especially vitamin C and B-group vitamins), antioxidants and mineral compounds. Although clinical research (whose results are

available in the literature) does not provide unequivocal evidence, relatively numerous scientific publications showed that the use of components which represent health values of the organic food are regarded as especially critical to the process of nutrition of patients. This concerns especially the above-mentioned components, i.e., vitamins, unsaturated fatty acids and mineral compounds [51,52,68,71,72].

The findings of this study concerning the opinions of carers of patients with Alzheimer's disease confirmed the insufficient knowledge about the usefulness of diets dedicated to patients in the group of carers of patients with Alzheimer's disease. It also seems, somehow intuitively, that the respondents sensed the usefulness of organic foods in the nutrition of patients with Alzheimer's diseases as they emphasized health benefits of such foods. Importantly, they were unable to fully identify these values, which may lead to difficulties in using specific organic products in diets of patients and choosing correct proportions in the diet. Therefore, it seems legitimate that knowledge in this field is promoted by both doctors and in mass media available to carers of people with Alzheimer's disease. According to the authors, it is critical to conduct in-depth interviews among people with Alzheimer's disease with participation of doctors who care for the patients and to perform clinical research of people with Alzheimer's disease and their carers to develop and introduce diets based on organic products.

Author Contributions: Introduction—S.D., A.C.-E., B.K., P.P., P.N., S.S.; Materials and Methods—S.D., A.C.-E., B.K., P.P., P.N., S.S.; Results—S.D., A.C.-E., B.K., P.P., P.N., S.S.; Conclusions—S.D., A.C.-E., B.K., P.P., P.N., S.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Acknowledgments: This paper was supported by the research project funded by financial resources for scientific research allocated by the Department of Labour, Capital and Innovation, Wrocław University of Economics, Wrocław, Poland and by the research project Excellence 2020, Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic.

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. Heyneman, S.; Lee, B. International organizations and the future of education assistance. *Int. J. Educ. Dev.* **2016**, *48*, 9–22.
2. National Nutrition Council. Healthy Diet, Gaining Habit—For Life. Available online: http://www.nnc.gov.ph/phocadownloadpap/FINAL_2017%20NM%20Talking%20Points.pdf (accessed on 18 October 2019).
3. Klimova, B.; Kuca, K. Multi-nutrient dietary intervention approach to the management of Alzheimer's disease—A mini-review. *Curr. Alzheimer Res.* **2016**, *13*, 1312–1318.
4. Lockyer, S.; Spiro, A.; Stanner, S. Dietary fibre and the prevention of chronic disease—Should health professionals be doing more to raise awareness? *Nutr. Bull.* **2016**, *41*, 214–231.
5. Klimova, B.; Kuca, K. Multinutrient Intervention in the Prevention and Treatment of Dementia. In *Role of the Mediterranean Diet in the Brain and Neurodegenerative Diseases*; Farooqui, T., Farooqui, A.A., Eds.; Academic Press: London, UK, 2018; pp. 341–351.
6. Muhammad, S.; Fathelrahman, E.; Ullah, R.U.T. The significance of consumer's awareness about organic food products in the United Arab Emirates. *Sustainability* **2016**, *8*, 833.
7. Dziuba, S.; Ingaldi, M. Market of the organic products in Poland according to potential customers. In 16th International Multidisciplinary Scientific GeoConference SGEM, Conference Proceedings, **2016**, Volume 5, pp. 341–348.
8. Padel, S.; Foster, C. Exploring the gap between attitudes and behaviour—Understanding why consumers buy or do not buy organic food. *Br. Food J.* **2005**, *107*, 606–625.
9. Magnusson, M.K.; Arvola, A.; Hursti, U.-K.K.; Åberg, L.; Sjöden, P.-O. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behavior. *Appetite* **2003**, *40*, 109–117.

10. Zanolli, R.; Naspetti, S. Consumer motivations in the purchase of organic food: A means-end approach. *Br. Food J.* **2002**, *104*, 643–653.
11. Aertsens, J.; Verbeke, W.; Mondelaers, K.; Guido Van, H. Personal determinants of organic food consumption: A review. *Br. Food J.* **2009**, *111*, 1140–1167.
12. Seyfang, G. Ecological citizenship and sustainable consumption: Examining local organic food networks. *J. Rural Stud.* **2006**, *22*, 383–395.
13. Schifferstein, H.; Ophuis, P. Health-related determinants of organic food consumption in the Netherlands. *Food Qual. Prefer.* **1998**, *9*, 119–133.
14. Smith-Spangler, C.; Brandeau, M.L.; Hunter, G.E.; Olkin, I.; Bravata, D.M. Are organic foods safer or healthier than conventional alternatives: A systematic review. *Ann. Intern. Med.* **2012**, *157*, 348–366.
15. Thøgersen, J. Country Differences in Sustainable Consumption: The Case of Organic Food. *J. Macromarketing* **2010**, *30*, 171–185.
16. Clarke, N.; Cloke, P.; Barnett, C.; Malpass, A. The spaces and ethics of organic food. *J. Rural Stud.* **2008**, *24*, 219–230.
17. Jolink, A.; Niesten, E. Sustainable development and business models of entrepreneurs in the organic food industry. *Bus. Strategy Environ.* **2015**, *24*, 386–401.
18. Stagl, S. Local organic food markets: Potentials and limitations for contributing to sustainable development. *Empirica* **2010**, *29*, 145–162.
19. Aschemann-Witzel, J.; Zielke, S. Can't buy me green? A review of consumer perceptions of and behavior toward the price of organic food. *J. Consum. Aff.* **2017**, *51*, 211–251.
20. Poulston, J.; Yiu, A.Y.K. Profit or principles: Why do restaurants serve organic food? *Int. J. Hosp. Manag.* **2011**, *30*, 184–191.
21. Alsaffar, A.A. Sustainable diets: The interaction between food industry, nutrition, health and the environment. *Food Sci. Technol. Int.* **2016**, *22*, 102–111, doi:10.1177/1082013215572029.
22. Perignon, M.; Vieux, F.; Soler, L.-G.; Masset, G.I.; Darmon, N. Improving diet sustainability through evolution of food choices: Review of epidemiological studies on the environmental impact of diets. *Nutr. Reviews* **2017**, *75*, 2–17, doi:10.1093/nutrit/nuw043.
23. Gu, Y.; Nieves, J.W.; Stern, Y.; Luchsinger, J.A.; Scarmeas, N. Food combination and Alzheimer disease risk a protective diet. *Arch. Neurol.* **2010**, *67*, 699–706.
24. Gray, S.; Jones, M.; Means, R.; Orme, J.; Pitt, H.; Salmon, D. Inter-sectoral transfer of the food for life settings framework in England. *Health Promot. Int.* **2018**, *33*, 781–790.
25. Pitt, H.; Jones, M.; Weitkamp, E. Every city a food growing city? What food growing schools London reveals about city strategies for food system sustainability. *Sustainability* **2018**, *10*, 2924.
26. Azzini, E.; Maiani, G.; Turrini, A.; Intorre, F.; Feudo, G.L.; Capone, R.; Bottalico, F.; el Bilali, H.; Polito, A. The health-nutrition dimension: A methodological approach to assess the nutritional sustainability of typical agro-food products and the Mediterranean diet. *J. Sci. Food Agric.* **2018**, *98*, 3684–3705.
27. Jones, M.; Pitt, H.; Oxford, L.; Bray, L.; Kimberlee, R.; Orme, J. Association between food for life, a whole setting healthy and sustainable food programme, and primary school children's consumption of fruit and vegetables: A cross-sectional study in England. *Int. J. Environ. Res. Public Health* **2017**, *14*, 639.
28. Kim, M.-J.; Lee, Ch.-K.; Woo, W.G.; Kim, J.M. Relationships between lifestyle of health and sustainability and healthy food choices for seniors. *Int. J. Contemp. Hosp. Manag.* **2013**, *25*, 558–576.
29. Jones, M.; Dailami, N.; Weitkamp, E.; Salmon, D.; Kimberlee, R.; Morley, A.; Orme, J. Food sustainability education as a route to healthier eating: Evaluation of a multi-component school programme in English primary schools. *Health Educ. Res.* **2012**, *27*, 448–458.
30. Food and Agriculture Organization of the United Nations. Consumers' concerns and external drivers in food markets. Available online: <http://www.fao.org/3/a-i4939e.pdf> (accessed on 18 October 2019).
31. The IFOAM Norms for Organic Production and Processing. Version 2014. Available online: https://www.ifoam.bio/sites/default/files/ifoam_norms_july_2014_t.pdf (accessed on 18 October 2019).
32. EC. Food Information to Consumers—Legislation. Available online: https://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation_en (accessed on 18 October 2019).
33. Organic Food Federation. Processing Standards. Available online: <http://www.orgfoodfed.com/wp-content/uploads/2016/12/Processing-Standards-November-2016.pdf> (accessed on 18 October 2019).

34. Dziuba, S.; Szoltysek, K. Uwagi ogólne na temat rolnictwa ekologicznego. In *Przewodnik do Cwiczeń Laboratoryjnych z Ekotrofologii*; Dziuba, S., Ed.; Wydawnictwo Uniwersytetu Ekonomicznego: Wrocław, Poland, 2012; pp. 9–28.
35. Draft Food Descriptors. Available online: http://www.efet.gr/images/efet_res/docs/descr2.pdf (accessed on 18 October 2019).
36. Gold MV. Organic Production/Organic Food: Information Access Tools. Available online: <https://www.nal.usda.gov/afsic/organic-productionorganic-food-information-access-tools> (accessed on 18 October 2019).
37. Lynch, D. Environmental impacts of organic agriculture: A Canadian perspective. *Can. J. Plant. Sci.* **2009**, *89*, 621–628.
38. Alroe, H.F.; Noe, E. What makes organic agriculture move-protest, meaning or market? A polyocular approach to the dynamics and governance of organic agriculture. *Int. J. Agric. Resour. Gov. Ecol.* **2008**, *7*, 5–22.
39. Goh, K.M. Greater mitigation of climate change by organic than conventional agriculture: A review. *Biol. Agric. Hortic.* **2011**, *27*, 205–229.
40. Staniak, S. Charakterystyka żywności produkowanej w warunkach rolnictwa ekologicznego. *Pol. J. Agron.* **2014**, *19*, 25–25.
41. Cierniak-Emerych, A.; Dziuba, S.; Soukal, I.; Jarossova, M. Interests of Organic Food Consumers. In *Hradec Economic Days 2018*; Jedlicka, P., Marešová, P., Soukal, I., Eds.; University of Hradec Kralove: Hradec Králové, Czech Republic, 2018; Volume 8, pp. 151–158.
42. EC. Data and Statistics. Available online: https://ec.europa.eu/agriculture/organic/eu-policy/data-statistics_en (accessed on 18 October 2019).
43. Media Kit. The World of Organic Agriculture. Available online: <https://www.fibl.org/fileadmin/documents/en/news/2017/mr-world-organic-agriculture-2017-english.pdf> (accessed on 18 October 2019).
44. Wasilik, K. Rolnictwo ekologiczne i rynek ekoproduktów w Polsce na tle innych krajów europejskich. *Handel Wewnętrzny* **2014**, *3*, 160–165.
45. Organic Foods in Poland 2017. Available online: <http://imas.pl/blog/raport-zywnosc-ekologiczna-w-polsce-2017-juz-do-pobrania/> (accessed on 18 October 2019).
46. Gomiero, T.; Pimentel, D.; Paoletti, M. Is there a need for a more sustainable agriculture? *Crit. Rev. Plant. Sci.* **2011**, *30*, 6–23.
47. Huber, M.; Bakker, M.; Dijk, W.; Prins, H.A.; Wiegant, F.A. The challenge of evaluating health effects of organic food: Operationalisation of a dynamic concept of health. *J. Sci. Food Agric.* **2012**, *92*, 2766–2773.
48. Fuller, R.J.; Norton, L.R.; Feber, R.E.; Johnson, P.J.; Chamberlain, D.E.; Joys, A.C.; Stuart, R.C.; Townsend, M.C.; Manley, W.J.; et al. Benefits of organic farming to biodiversity vary among taxa. *Biol. Lett.* **2005**, *1*, 431–434.
49. Mäder, P.; Fliessbach, A.; Dubois, D.; Gunst, L.; Fried, P.; Niggli, U. Soil fertility and biodiversity in organic farming. *Science* **2002**, *296*, 1696–1697.
50. Brandt, K.; Molgaard, P. Organic agriculture: Does it enhance or reduce the nutritional value of plant foods? *J. Sci. Food Agric.* **2001**, *81*, 924–931.
51. Hunter, D.; Foster, M.; McArthur, J.O.; Ojha, R.; Petocz, P.; Samman, S. Evolution of the micronutrient composition of plant foods produced by organic and conventional agricultural methods. *Crit. Rev. Food Sci. Nutr.* **2011**, *51*, 571–582.
52. Lairon, D. Nutritional quality and Safety of organic Food A review. *Agron. Sustain. Dev.* **2010**, *30*, 33–41.
53. Högborg, A.; Pickova, J.; Babol, J.; Andersson, K.; Dutta, P.C. Muscle lipids, vitamins E and A, and lipid oxidation as affected by diet and RN genotype in female and castrated Male Hampshire crossbreed pigs. *Meat Sci.* **2002**, *60*, 411–420.
54. Kamishiro, S.; Stergiadis, S.; Leifert, C.; Eyre, M.D.; Butler, G. Meat quality and health implications of organic and conventional beef production. *Meat Sci.* **2015**, *100*, 306–318.
55. Palupi, E.; Jayanegara, A.; Ploeger, A.; Kahl, J. Comparison of nutritional quality between conventional and organic dairy products: A meta-analysis. *J. Sci. Food Agric.* **2012**, *92*, 2774–2781.
56. Williamson, C.S. Is organic food better for our health? *Nutr. Bull.* **2007**, *32*, 104–108.
57. Zevenbergen, H.; de Bree, A.; Zeelenberg, M.; Laitinen, K.; van Duijn, G.; Floter, E. Foods with a high fat quality are essentials for healthy diets. *Ann. Nutr. Metab.* **2009**, *54*, 15–24.

58. Asami, D.K.; Hong, Y.J.; Barrett, D.M.; Mitchell, A.E. Comparison of the total phenolic and ascorbic acid content of freeze-dried and air-dried marionberry, strawberry, and corn grown using conventional, organic, and sustainable agricultural practices. *J. Agric. Food. Chem.* **2003**, *51*, 1237–1241.
59. Huber, M.; Rembalkowska, E.; Srednicka, D.; Bugel, S.; van de Vijver, L.P.L. Organic food and impact on human health: Assessing the status quo and prospects of research. *NJAS* **2011**, *58*, 103–109.
60. Kłapeć, T.; Borecka, A. Contamination of vegetables, fruits and soil with geohelminths eggs on organic farms in Poland. *Ann. Agric. Environ. Med.* **2012**, *19*, 421–425.
61. Romanowska, D. Odkryć błędy młodości. *Wprost* **2001**, *18*, 4.
62. Klimova, B.; Maresova, P.; Valis, M.; Hort, J.; Kuca, K. Alzheimer's disease and language impairments: Social intervention and medical treatment. *Clin. Interv. Aging* **2015**, *10*, 1401–1408.
63. Klimova, B.; Valis, M.; Kuca, K. Bilingualism as a strategy to delay the onset of Alzheimer's disease. *Clin. Interv. Aging* **2017**, *12*, 1731–1737.
64. Larsson, S.C.; Traylor, M.; Malik, R.; Dichgans, M.; Burgess, S.; Markus, H.S. Modifiable pathways in Alzheimer's disease: Mendelian randomisation analysis. *BMJ* **2017**, *359*, 5375.
65. Wang, J.; Gu, B.J.; Masters, C.L.; Wang, Y.J. A systemic view of Alzheimer disease—Insights from amyloid- β metabolism beyond the brain. *Nat. Rev. Neurol.* **2017**, *13*, 612–623.
66. Pivi, G.A.K.; de Andrade Vieira, N.M.; da Ponte, J.B.; de Maraes, D.S.C.; Bertolucci, P.H.F. Nutritional management for Alzheimer's disease in all stages: Mild, moderate, and severe. *Nutrire* **2017**, *42*, 1.
67. Lee, T.J.; Kolasa, K.M. Feeding the person with late-stage Alzheimer's disease. *Nutr. Today* **2011**, *46*, 75–79.
68. Soininen, H.; Solomon, A.; Visser, P.J.; Hendrix, S.B.; Blennow, K.; Kivipelto, M.; Hartmann, T. LipiDiDiet clinical study group. 24-month intervention with a specific multinutrient in people with prodromal Alzheimer's disease (LipiDiDiet): A randomised, double-blind, controlled trial. *Lancet Neurol.* **2017**, *16*, 965–975.
69. Morris, M.C.; Tangney, C.C.; Wang, Y.; Sacks, F.M.; Bennett, D.A.; Aggarwal, N.T. MIND diet associated with reduced incidence of Alzheimer's disease. *Alzheimers Dement* **2015**, *11*, 1007–1014.
70. Augustin, K.; Khabbush, A.; Williams, S.; Eaton, S.; Orford, M.; Cross, J.H.; Heales, S.J.R.; Walker, M.C.; Williams, R.S.B. Mechanisms of action for the medium-chain triglyceride ketogenic diet in neurological and metabolic disorders. *Lancet Neurol.* **2018**, *17*, 84–93.
71. Otaegui-Arrazola, A.; Amiano, P.; Elbusto, A.; Urdaneta, E.; Martínez-Lage, P. Diet, cognition, and Alzheimer's disease: Food for thought. *Eur. J. Nutr.* **2014**, *53*, 1–23.
72. Fudala, M.; Broła, W.; Przybylski, W.; Czernicki, J. Czy badanie poziomu homocysteiny i witaminy B 12 ma szansę zostać kluczem do rozpoznania i leczenia choroby Alzheimera? *Studia Med.* **2008**, *10*, 63–58.
73. Marczak, M.; Marczak, R. Prawda w badaniach naukowych na przykładach tribologii. *ZEM* **2006**, *41*, 35.

