

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Tropical AgriSciences



Czech University of Life Sciences Prague

**Faculty of Tropical  
AgriSciences**

**Consumer attitudes to Dietary supplements and Functional food**

**Case study in the Czech Republic**

Diploma thesis

Prague 2016

**Supervisor:**

Ing. Petra Chaloupková, Ph.D.

**Author:**

Bc. Petra Kostková

## **Declaration**

I hereby declare that this master thesis is exclusively my own work. I confirm that I am properly citing all the sources and literature which were used in thesis

.....

Date

.....

Author's signature

## **Acknowledgement**

I would like to thank my supervisor Ing. Petra Chaloupková, Ph.D. for her help, kind advice and support in data collection. As well I would like thank respondents for their willingness to fill in the questionnaires. Last but not least, I would like to thank my family and friends for their long-term support.

## **Abstract**

General objective of the thesis was to determine consumer attitudes to dietary supplements and functional foods among Czech citizens, mainly to find out which dietary supplements and functional foods were used in the Czech Republic and to identify reasons for their use. This study also determined consumer preferences in the purchase and identified the “typical user” of dietary supplements and functional foods products in the Czech Republic. Information about usage of dietary supplements (DS) and functional food (FF), interest in composition of these products and consumer behaviour were examined according to sociodemographic data to analyse the dependencies. Differences in habits between gender and age group were examined too.

As a tool to attain the results was used questionnaire survey, which was distributed in person through the whole country and via online. The respondents were chosen both randomly and non-randomly.

It was found a high prevalence of dietary supplements and functional foods in the Czech Republic. The most popular were fibre and unsaturated fatty acids, which were used on regular basis. The main reported reason for using DS and FF was to enhance immune system and defensive capacity and to support body’s resistance against fatigue and stress. Women used dietary supplements and functional foods more than men. In general, Czech citizens were interested in composition of dietary supplements and functional foods products and preferred natural products. More frequent than other places of purchase were pharmacy and specialized shops and the majority of respondents spent less than 250 CZK per month. The main source of information about these products was the Internet. Major determining factor in the purchase was the product’s composition and price.

**Keywords:** dietary supplements, functional food, consumer behaviour, Czech Republic

# Content

1.	INTRODUCTION.....	1
2.	LITERATURE REVIEW.....	3
2.1.	DIETARY SUPPLEMENTS .....	3
2.1.1.	General information .....	3
2.1.2.	Overview of dietary supplements.....	4
2.1.3.	Distribution of dietary supplements .....	5
2.1.4.	Consumer acceptance of dietary supplements.....	6
2.1.4.1.	China .....	6
2.1.4.2.	The Netherlands .....	7
2.1.4.3.	Poland.....	7
2.1.4.4.	The United States .....	7
2.1.5.	Legislation.....	8
2.1.5.1.	Czech Republic .....	8
2.1.5.2.	European Union.....	9
2.2.	FUNCTIONAL FOODS .....	10
2.2.1.	General information .....	10
2.2.2.	Production of functional foods .....	11
2.2.3.	Functional foods and their effect on health.....	11
2.2.4.	Consumer acceptance of functional food .....	14
2.2.4.1.	Brazil .....	15
2.2.4.2.	Canada.....	15
2.2.4.3.	China .....	16
2.2.4.4.	Russia .....	16
2.2.5.	Legislation.....	17
3.	AIMS OF THE THESIS .....	18
4.	METHODOLOGY .....	19
4.1.	Data collection.....	19
4.2.	Questionnaire design .....	20
4.3.	Data analysis .....	20
5.	RESULTS .....	21
5.1.	Description of sample.....	21
5.2.	Consumption of DS and FF products.....	22
5.3.	Consumer behaviour .....	26

5.3.1.	Composition of Dietary supplements and Functional foods .....	27
5.3.2.	Consumer purchase behaviour .....	28
5.3.3.	Source of information on Dietary supplements and Functional foods .....	29
5.3.4.	Factors in decision on purchase of Dietary supplements and Functional foods..	30
5.3.5.	Place of origin and production of Dietary supplements and Functional foods ...	31
6.	DISCUSSION .....	32
7.	CONCLUSION .....	37
8.	REFERENCES.....	38

## List of tables and figures

<b>Table 1:</b> The main type of functional foods.....	13
<b>Table 2:</b> Sociodemographic characteristics of the respondents .....	21
<b>Table 3:</b> Association between use of DS/FF and level of education .....	25
<b>Table 4:</b> Most common reasons for use DS and FF .....	26
<b>Figure 1:</b> Types of DS and FF use in the Czech Republic .....	23
<b>Figure 2:</b> Interest in composition of DS and FF .....	27
<b>Figure 3:</b> Frequency of purchase of DS and FF .....	28
<b>Figure 4:</b> Most important source of information on DS/FF by the participants.....	29
<b>Figure 5:</b> Factors in decision on purchase of DS and FF products.....	30

## **List of abbreviations**

CCFN- The Canadian Council of Food and Nutrition

CRN- Council for Responsible Nutrition

EC- European Commission

EUFIC- European Food Information Council

EFSA- European Food Safety Authority

EU- European Union

FDA- U.S. Food and Drug Administration

IFIC- International Food Information Council Foundation

SÚKL- Státní ústav pro kontrolu léčiv



## **1. INTRODUCTION**

Dietary supplements (DS), often referred to as food or nutrient supplements, may be defined as concentrated sources of nutrients or other substances with a nutritional or physiological effect, marketed in dose form, with the purpose of supplementing the normal diet (Neves and Caldas, 2015; EFSA, 2015). Functional food products (FF) have been defined as providing an added health benefit over and above the food product's traditional nutritional value (Frewer et al., 2013). The main consumer reason for purchasing FF is the increasing desire to use foods either to help prevent chronic illnesses such as cardiovascular disease, Alzheimer's disease and osteoporosis, or to optimise health, for example by increasing energy or boosting the immune system (Khan et al., 2013). The popularity of DS and FF are currently widespread worldwide and the use of them has been increasing worldwide in the last decades (Petroczi et al., 2011; Neves and Caldas, 2015).

In case of DS, the consumption is identified by a combination of social, psychological, knowledge-based, and economic factors. It has been studied that users of DS are people who want to take care of their health. The use of DS sharply increased especially in the United States (U.S.). It is estimated that about half of the US inhabitants currently uses DS (Bailey et al., 2011; Rovira et al., 2013). In the United Kingdom (UK) and many other countries are DS popular as well (Lieberman et al., 2015). The few data on the prevalence of DS consumption in European countries describes a north- south gradient, with greater use in northern European countries (Rovira et al., 2013).

Nowadays we are witnesses to changes in values. Consumers are more interested in their health and pay more attention to the healthiness of their diet. These trends in consumption set up new challenges for the food industry to develop new food products called FF (Szakály et al., 2012). The increasing demand on such foods can be explained by the increasing cost of healthcare, the steady increase in life expectancy and the desire of older people to improve quality of their later years (Kotilainen et al., 2006; Siró et al., 2008). The world market for FF is highly dynamic (Bech-Larsen and Scholderer, 2007). According to a Euromonitor survey, Japan is the world's largest market, followed by the U.S., while the European market is still less developed (Bigliardi and Galati, 2013). This fact has often been attributed to a restrictive and contradictory health claim legislation in

and between the European countries. Next option, why European market is less developed, is the fact that Europeans compared to respondents from Asia- Pacific, and North America as well as South America are more willing to believe that FF have no additional health benefits (Bech-Larsen and Scholderer, 2007). The major markets in Europe are in the UK, Germany, France and Italy (Bech-Larsen and Scholderer, 2007; Bigliardi and Galati, 2013). The European market is a heterogeneous one, described by large regional differences in use and acceptance of FF (Bigliardi and Galati, 2013). Generally, the interest of consumers in FF in the Central and Northern European countries is higher than in Mediterranean countries, because local people have appreciated natural, fresh foods and consider them better for health (Menrad, 2003; Siró et al., 2008). Dietary supplement and functional food contain health- promoting substances that often come from developing countries and increase their production can also help development in poor areas of the world.

## **2. LITERATURE REVIEW**

### **2.1. DIETARY SUPPLEMENTS**

#### **2.1.1. General information**

Definitions of DS are listed in the law of food and also in the EU Directive. It is a food for direct consumption whose purpose is to supplement the normal diet. These foods are different from other with high content of vitamins, minerals or other substances with nutritional or physiological effect (Michalová, 2007). DS include any amino acids, edible substances, herbs, minerals, synthetic nutrients and vitamins sold singly or in mixtures in controlled dosage forms as capsules, liquids, lozenges, pastilles, powders, softgels, gelcaps or tablets (FDA, 2016). The aim is to supplement the normal diet to a level which positively affecting the health status of the consumer (Michalová, 2007). Some supplements can help ensure to get an adequate dietary intake of essential nutrients; others may help to reduce the risk of disease. However, supplements should not replace the variety of foods that are important to a healthful diet. Unlike drugs, supplements are not intended to treat, diagnose, prevent, or cure diseases. That means supplements should not make claims, such as “reduces arthritic pain” or “treats heart disease.” Claims like these can only legitimately be made for drugs, not dietary supplements (FDA, 2016).

Addition to the advantages may occur risks associated with using DS. Many supplements contain active ingredients that have strong biological effects in the body. This could make them unsafe in some situations, and hurt or complicate human health. Harmful to health could be combining supplements, using supplements with medications, substituting supplement for prescription medicines or taking too much of some supplements, such as vitamin A, vitamin D or iron. Some supplements can also have unwanted effects before, during, and after surgery (FDA, 2016).

### 2.1.2. Overview of dietary supplements

There is described the list of main dietary supplements and their main characteristics.

*Vitamins and minerals* (micronutrients) which contain a subset of multivitamins. These substances are known as micronutrients and at their lack could injure human health.

*Antioxidants* are a group of vitamins, minerals, extracts and other substances that suppress so-called oxidative stress in the body.

*Plant extracts* (extracts) used in various forms, such as tablets, teas, capsules, infusions and tinctures.

*Dietary supplements supporting weight loss* for control of body mass.

*Supplements for encouragement* are important for overall mental and physical condition, vitality or sexual performance (aphrodisiac).

*Dietary supplements to the problems with knuckles*, the ingredients are minerals (magnesium, calcium, phosphorus, silicon), vitamins, antioxidants (selenium) and extracts from animals cartilage or gelatin.

*Probiotics* are live microorganism added to food or DS, positively affect the health of the consumer by improving the balance of intestinal microflora.

*Enzymes* are represented by e.g. Lactose.

*Sport nutrition supplement* are used to support sport activities.

*Supplements with fatty acids* (unsaturated) support weight loss, reduce cholesterol level or inhibit the formation of so-called Leukotrienes and Prostaglandins, which promote inflammatory processes or deepen unpleasant feelings during menstruation (Motlová, 2008).

### 2.1.3. Distribution of dietary supplements

DS are a very diverse group of substances and offer many ways how to divide them. In this thesis I divide DS according to origin and according to effects.

#### 1.3.1 Distribution according to origin

- a. Vitamins - are no energetic substances of organic origin, long-term low supply any of the vitamins in the diet can cause disorders of the lack with specific symptoms or disorder with characteristic symptoms, which may in some cases seriously endanger human health.
- b. Minerals - are essential biogenic elements. We divide them in essential macronutrients (magnesium, potassium, calcium) and essential micronutrients (selenium, zinc, iron) according to daily consumption.
- c. Botanicals- portions of intact plant, enriched extracts fractions from extracts or chemically defined substances
- d. Substances of animal origin
- e. Other substances that not belong to the previous categories (Baumann, 2009)

#### 1.3.2 Distribution according to effects

- a. Antioxidants
- b. Adaptogens (*Panax ginseng*)
- c. Substances to soothe and stimulate the central nervous system
- d. Substances used in the change of cerebral metabolism mediators (Alzheimer's and Parkinson's disease)
- e. Substances used in chronic fatigue syndrome
- f. Immunostimulancia (*Echinacea purpurea*)
- g. Substances which influence the risk of neoplasm
- h. Substances used in the functional damage of the cardiovascular system
- i. Substances for affecting the bodyweight
- j. Substances for influencing the structure of the organism
- k. Substances used in certain periods of life
- l. Substances use in old age (Baumann, 2009)

#### **2.1.4. Consumer acceptance of dietary supplements**

Based on available literature I selected two countries from different places in the world and two countries from Europe to give an example of consumer acceptance and behaviour to dietary supplements.

##### **2.1.4.1.China**

Main health challenges facing China today are ageing population and obesity (SlideShare, 2013). Currently, the average Chinese spends 28 times less on vitamins and DS compared to Americans (Daxueconsulting, 2015). Consumers in China prefer DS for immunity improvements, vitamins and DS for fatigue improvements. Over seventy percent of consumers purchase DS for themselves and their family. Others (about 22%) purchase DS as a gift. Mostly DS buy in pharmacies or drug stores, followed by supermarkets (SlideShare, 2013). Currently, Chinese consumers are appreciating calcium and protein powder most of all. This shows the desire of being taller and stronger of children and young people. Those functions are mainly found under the form of Calcium/Protein fortification, Lecithin, Spirulina, vitamins, Propolis. The Chinese are searching for more convenient products. Consuming vitamins and dietary supplements must be performed daily so the most appetizing tastes and products forms are popular. Vitamins oriented products are also the trend in China. More traditional Chinese ingredients are getting increasingly popular. In China is found the most traditional vitamins and dietary supplements, e.g. donkey-hide gelatine, ginseng and Cordyceps sinensis. China is very suitable environment for import of DS. The Chinese are avoiding local brands because of low confidence to Chinese vitamins and DS companies. The consumer association of China believes that Chinese companies lost consumer's trust by promoting false effects of DS, lying advertisement and inability to observe the regulations. Moreover, the Chinese have a lack of knowledge about vitamins and DS and cannot be dependent on professional guidance. Popular imported DS include herbal, beauty and weight control products (Daxueconsulting, 2015).

#### 2.1.4.2. The Netherlands

From the national food consumption surveys it seems that the percentage of DS users increases over time. During fifteen years (1988-2003) consumption increase by 10%, not only for the total population, but also within different age groups (Ocké et al., 2005). People aged from 7 to 69 years use DS overall (33, 7%), 40% in wintertime and 27% during the rest of year. Women predominate among DS users. Consumers in the age group 31-50 years receive DS most often. Other age categories, it means 19-30 years and 51-69 years, have a lower level of DS consumption (Burma-Rethans, 2012). Also usage of DS is higher among better-educated people (Ocké et al, 2005). Popular DS in the Netherlands are multivitamins/minerals, vitamin C, fish oil, vitamin B and calcium (Burma-Rethans, 2012). Users prefer DS in the form of tablets, capsules and coated tablets (Ocké et al., 2005)

#### 2.1.4.3. Poland

It is predicted further dynamic performance of vitamins and DS in Poland. Polish consumers are becoming more educated and wealthier in term of their health care. Ascendant education levels contribute to better knowledge on nutrition and health, as well as a higher interest in the ingredients included in the products they use (Euromonitor, 2015). Women are more likely to be DS users than men. They are also more interested in their health and in using products that promise to save youth and beauty and they are aware of the potential skeletal disorders. It is evident that consumers of DS are living in larger towns, particularly in the capital city Warsaw, than in small villages. Minerals are taken less than vitamins. One of the most important factors that influence the decision to take DS were health problems, and almost half of respondents in survey, conducted during years 1993-1995, who take DS did it base on doctor recommendation (Pietruszka and Brzozowska, 1999).

#### 2.1.4.4. The United States

Gahche et al. (2011) indicates high use of DS in the U.S. adult population during past 20 years, with over 40 % of adults using one or more DS during 1988-1994, and over one-half of adults using supplements from 2003 to 2006. Currently around half of adults declare using one or more DS (Bailey et al., 2013). Major motivation of using DS is

related to overall health, following by fill nutrient gaps in diet, bone and immune health (CRN, 2014). Many characteristics of people who use DS are identified. Usage of DS is higher among women than men. Users tend to be older, are more physically active and have higher educational level and socioeconomic status compared with nonusers (Bailey et al., 2013). Vitamins and minerals are the most popular category of DS. From category specialty supplements are the most widely used omega-3/fatty acids, fibre and probiotics. As a reliable source of information about supplements 52% of users identify medical doctors. When purchasing DS, people in U.S. choose nationally recognized brands or store brands from a trusted retailer. Mass merchandisers, pharmacies and supermarkets are the common places where users have purchased supplements (CRN, 2014). In comparison to the general population, college students appear more likely to use DS. Lieberman et al. (2015) determine that 66% of college students surveyed used DS at once a week, mainly multivitamins/multi-minerals, vitamin C, protein/ amino acids and calcium. Student's motivations to use DS are to promote general health, to provide more energy, to increase muscle strength and to enhance performance.

### **2.1.5. Legislation**

#### **2.1.5.1. Czech Republic**

Dietary supplements assesses and approves the Ministry of Health of the Czech Republic. Before putting these products on the market, the Ministry of Health considers only their safety which means that their long-term use should not damage human health. The effectiveness of DS is not evaluated (SÚKL, 2010). In the Czech Republic is valid decree n. 225/2008 Sb. which sets requirements on DS and the enrichment of foodstuffs. Decree regulates the requirements for the labelling of dietary supplements:

- a. in the title word "dietary supplement"
- b. name of vitamins, minerals or other substances
- c. indication of the substance in the percentage of the recommended daily allowance
- d. recommended daily dosage and warnings before its crossing
- e. warning that products are kept out of reach of children
- f. warning that DS are not a substitute for a varied diet



- g. warning “Not suitable for pregnant” on DS containing more than 800 µg of vitamin A in a daily dose (Baumann, 2009)

The labelling of DS have not to attribute to DS the properties of preventing, treating or curing human disease and to contain confusing claims or implying that a balanced, varied diet cannot provide sufficient amount of vitamins or minerals (SÚKL, 2010).

#### 2.1.5.2. European Union

The European Commission has defined adjusted rules to help ensure that DS are safe and duly labelled. In the EU, dietary supplements are controlled as foods and the legislation concentrates on vitamins and minerals used as additives of dietary supplements. The main EU legislation is Directive 2002/46/EC related to dietary supplements including vitamins and minerals.

The Directive defines labelling requirements and requires that EU-wide maximum and minimum levels are set for each vitamin and mineral added to supplements. Immoderate intake of vitamins and minerals may result in unfavourable effects, the Directive establishes for the setting of maximum amounts of vitamins and minerals added to food supplements. In addition, its Annex II, which was amended by Regulation 1170/2009 of November 2009, incorporates a list of permitted vitamin or mineral substances that may be added for specific nutritional function in food supplements.

Vitamin and mineral substances may be considered for inclusion in the lists following the evaluation of an appropriate scientific documentation related to the safety and bioavailability of the individual substance by European Food Safety Authority (EFSA). Companies wishing to market a substance not included in the permitted list need to submit an application to the European Commission (EFSA, 2015).

## 2.2. FUNCTIONAL FOODS

### 2.2.1. General information

The term “functional food” has already been defined several times, so far there is no unitary accepted definition for this group of food (Roberfroid, 2002; Alzamora et al., 2005; Siró et al., 2008). In most countries there is no legislative definition of the term and drawing a border line between conventional and functional foods is challenging even for nutrition and food experts (Mark-Herbert, 2004; Niva, 2007). Generally, FF are considered as those foods which are determined to be consumed as part of the normal diet and contain biologically active components which offer the possibility of enhanced health or reduced risk of disease (EUFIC, 2006). These FF products result from technological innovation, such as cholesterol lowering spreads, xylitol-sweetened chewing gum and dairy products fermented with specific lactic acid bacteria, or are from a naturally functional food such as soy, oats and grains high in fibre. FF have been developed in most food groups and the global market size is conservatively estimated to exceed that for organic foods. In addition to providing new possibilities for improving health and well-being, the functional foods sector offers potential for new economic opportunities. In developed countries with the increasing ageing population and the increasing prevalence of lifestyle related diseases, a lot of people use FF. Related to this, the market of FF is rapidly growing. In developing countries, similar public health trends are evolving among higher socio-economic groups and FF also have entered these markets. Growing domestic markets and the option of exports to the dominant markets of the United States, Europe and Japan provide economic opportunities in this sector. Many developing regions have vast biodiversity that can be tapped for new sources of functional foods or functional ingredients. This prospective source and the increased economic value from functional foods can offer new or improved opportunities for all in the supply chain, starting from primary producers and many developing countries could potentially benefit from investing in FF products (Kotilainen et al, 2006).

### **2.2.2. Production of functional foods**

The production of FF is based on the ordinary conventional methods supplemented by the following technological approaches:

1. Enrichment of physiologically functional additives, such as fibre, oligosaccharides, alcohols sugar, amino acids, peptides and proteins, vitamins, lecithin, mineral substances, polyunsaturated fatty acids, natural extracts.
2. Minimalization of undesirable factors, e.g. hypoallergenic rice with enzyme removed allergens, milk without lactose, animal products without cholesterol, product with reduced content of common salt or sodium, “light” products.
3. Utilization protective effects “phytochemicals” of vegetables, fruits, spices and other plant sources, e.g. antioxidants such as prevention of cancer. In this case we talk about e.g. flavonoids, carotenoids, phenolic acids and phytoestrogens. The source are various plant, e.g. garlic, green tea, soya, cereals, some kinds of vegetables, citrus, flax and hemp seeds.
4. Utilization of milk microbial cultures, probiotics and prebiotics (Zídková, 2013)

### **2.2.3. Functional foods and their effect on health**

Functional foods have been developed almost in all food categories, even if they are not homogeneously distributed over all segments of the food industry. As an impact, consumer preferences may be different between markets. Among all the food markets, functional foods have been mainly launched in the dairy, confectionery, soft-drinks, bakery and baby-food market. The extant literature proposes different classification of functional foods. From a product point of view, Sloan (2000), Kotilainen et al. (2006), Spence (2006) have proposed the following classification:

- food fortified with additional nutrients (labelled fortified products), such as fruit juices fortified with vitamin C, vitamin E, folic acid, zinc and calcium;
- food with additional new nutrients or components not normally found in a particular food (labelled enriched products), like probiotics or prebiotics;

- food from which a deleterious component has been removed, reduced or replaced by another with beneficial effects (labelled altered products), for example fibres as fat releasers in meat or ice cream;
- food in which one of the components have been naturally enhanced (labelled enhanced commodities), e.g., eggs with increased omega-3 content.

According to alternative classification based on the aim of functional foods, they can be classified as FF that add a good to life or improve children's life, like prebiotics and probiotics, FF that reduce an existing health risk problem such as a high cholesterol or high blood pressure and FF which makes life easier, such as lactose-free or gluten-free products (Bigliardi and Galati, 2013).

Irrespective of the classification adopted, it is possible to list the main functional foods. The following table (Table 1.) represents the main type of FF, example, source of FF and potential benefits from the use.

In the Czech Republic, the Ministry of Health lists these types of FF:

- Fermented milk products, yogurts, acidophilic milk and more.
- Products with increased amount of fibre, e.g. graham bread, whole grain pasta and more.
- Margarines and dairy products enriched with plant sterols.
- Foods fortified with iodine.
- Foods suitable for weight loss.
- Natural functional foods, many fruits, vegetables and grain contain specific substances whose activities in the prevention of lifestyle diseases are known today (Zídková, 2013).

**Table 1:** The main type of functional foods

<b>Type of functional food</b>	<b>Example</b>	<b>Source</b>	<b>Potential Benefit</b>
Probiotics	Lactic acid bacteria (LAB) and bifidobacteria	certain yogurts and other cultured dairy and non-dairy products	supports maintenance of digestive and immune health
Prebiotics	Fructo-oligosaccharide (FOS), inulin, polydextrose, lactulose	whole grains, onions, garlic, honey	supports maintenance of digestive health, supports calcium absorption
Functional drinks	ACE drinks, cholesterol lowering drinks or “bone health” drinks	beverage fortified with vitamins A,C and E	reduce cholesterol level, stimulate the antioxidant function and avoid the inhibition of growth and the deformation of the bones
Functional cereals	Oat, barley, rye, spelt	fortified food (e.g. oatmeal, bran, flour)	may reduce risk of coronary heart disease, supports maintenance of healthy blood glucose levels
Functional meat	Meat with the control of the composition of raw and processed materials	meat modified by adding ingredients	supports maintenance of immune; helps regulate metabolism and supports blood cell formation
Functional eggs	egg enriched with omega-3 fatty acids simultaneously with antioxidants and other vitamins	eggs with increased omega-3 fatty acid content	reduce the possible formation of blood clots and for blood pressure control

Source: International Food Information Council Foundation, 2011

#### **2.2.4. Consumer acceptance of functional food**

The three main markets of FF, Japan, U.S. and Europe, exhibit somewhat different characteristics and focus area. In Japan and Europe, intestinal health forms the most outstanding area. In contrast, in the U.S., heart health and cancer prevention are emphasized. Consumer health problems and product preferences are varied. Globally, dairy products represent the highest value sales. Functional confectionery, non-alcoholic drinks and bakery and/or cereal product follow in popularity (Kotilainen et al, 2006). In the heterogeneous European markets, there are large regional differences in use and acceptance of functional foods. Traditionally, southern Europeans have appreciated natural, fresh foods and consider those good for health. In northern Europe many food technology innovations have experienced remarkable market success such as the daily dose probiotic dairy products which have been the most popular product category across Europe. European consumers tend to use functional foods mostly for their health-promoting or disease risk preventing properties. (Menrad, 2003). Within Europe Germany, France, the United Kingdom and the Netherlands represent the most important countries within the FF market. In 2003, the European market of FF was dominated by intestinal health products, in particular probiotics (Menrad, 2003).

Factors that could possibly influence acceptance of functional food are food neophobia, trust and health motivation. In European countries, consumers with higher scores on the food neophobia scale are less willing to buy FF, compared with lower-scoring consumers (Siegrist et al. 2015).

In case of position of FF in the Czech Republic, most people know foods that have a preventive effect against diseases but they do not know the term functional food. Foods that have a preventive effect buy regularly. Women try to follow a healthy diet more than men and they are in the age of 31-50 years. Published scientific evidence and advice from a doctor have the biggest influence when buying FF (Zídková, 2014).

Based on available literature I chose four countries around the world (Brazil, Canada, China and Russia) to give an example and difference of consumer acceptance and behaviour to functional foods. Each country has a different culture and it is interesting to recognize it also in healthy eating habits.

#### 2.2.4.1. Brazil

Brazil is one of the leading countries in food production and consumption. The market for FF have been growing 10% per year (Barcellos and Lionello, 2011). In Brazil, there are mainly 4 categories counting with FF- drinks, dairy, pastry and cereals. The segment is dominated by dairy products, especially probiotics yogurt is popular (Jerger, 2012). Generally, functional food is perceived by health-conscious Brazilian consumers to be helpful in addressing specific health conditions. Nowadays, overweight and obesity is the major health issue in Brazil. It was noted that the rate of obese people increased in all age branches from five years and upwards (Agriculture and Agri-Food Canada, 2013). Besides obesity are most frequent occur diseases, such as stress, hypertension and constipation (Jerger, 2012). In case of distribution of FF, consumers most often buy these products in supermarkets and hypermarkets, it is representing more than 95% of FF sales (Agriculture and Agri-Food Canada, 2013). There is a trend of increasing interest in more sophisticated and health-oriented products. This due to that the population is becoming more educated. Higher education is usually associated with the regular consumption of a wider variety of foods. Consumption of health-oriented products is also related with income. Wealthiest consumers can spend more money in healthy food in general. In Brazil is evident that FF consumers living in urban areas, with opportunity to access media and information channels, are becoming increasingly aware of the health impact of certain food products and the diet as whole. Some studies also show that the Brazilian mature and elderly population, with higher levels of education and access to information, tend to make the connections between a healthy diet and disease prevention more often than other age groups (Barcellos and Lionello, 2011).

#### 2.2.4.2. Canada

Generally, Canadians are interested in living healthier lives. Nevertheless, a sedentary lifestyle and poor eating habits cause a number of civilization diseases. Chronic disease is a major issue. Cardiovascular disease and cancer are the main causes of death for Canadians. Obesity is also an important health issue in this country, especially among First Nation, Inuit and Métis population. It was found that residents of rural areas are more likely to be obese than urban residents. 58% of rural residents are overweight or obese, compared with 50% of urban residents. In Canada, FF have been on the market for many years, the greatest consumer interest is the area of digestive health. Dominated

category are dairy products, particularly yogurt. Its level of consumption increased based on the rising consumer awareness of the health benefits of probiotics (Agriculture and Agri-Food Canada, 2010). Besides yogurt with added probiotics, Canadians purchase cereals (e.g. whole grain, increased fibre, added omega-3s or omega-6s), healthy snack food and juice with added nutrients, antioxidants, etc. (Agriculture and Agri-Food Canada, 2015). The most influential drivers of FF choice are the composition and country of origin of the product. Canadian are also interested whether a food was organically grown. Canadians are quite knowledgeable about nutrition. Women have much greater knowledge about nutrition than men, on the other hand seniors (more than 65 years) and youth (less than 25 years) consider themselves to be least knowledgeable. The information about FF products Canadians obtain mainly from food product label (68%), the Internet (51%) and literature (46%), such as magazines, newspapers and books (CCFN, 2008).

#### 2.2.4.3.China

Many factors influence the FF market and its potential in China. One factor is to improve overall health and to support healthy aging which is a significant trend brought on by a high median age rate that is only expected to grow. Functional baby food and dairy products are the leaders of FF market in China (Agriculture and Agri-Food Canada, 2014). Very popular are functional drinks which regulate body functions and strengthen immunity. Since 2008, the overall functional beverage growth rate in China makes 29% and is expected to intensify with rapid industry developments (FOODNavigator-asia.com, 2011).

#### 2.2.4.4.Russia

The Russian FF market is still comparatively small but shows promise (Kotilainen et al., 2006). Russian consumers are following the global trend toward healthy food and lifestyle. According to Euromonitor International, Russians are concerned about their health and preference to high-quality products with additional nutritional value (Agriculture and Agri-Food Canada, 2011). The most significant health problem in Russia is cardiovascular disease which is responsible for over 50% of death. Major determinant of cardiovascular disease is inappropriate diet. Nowadays the demand for FF



is high among the higher income population (Kotilainen et al., 2006). The dairy industry leads the FF sector. Probiotic dairy products, such as yogurt, have always been popular in Russia. Bakery food products, juices and baby food are considered as innovative and dynamic sectors. Because of some historical quality issues and problems with forged products, Russian consumers read product label very carefully and are ready to pay more for branded products (Agriculture and Agri-Food Canada, 2011).

### **2.2.5. Legislation**

Although functional foods have been a topic of considerable interest in the food and nutrition field for years, a shared expert understanding of what is covered by the term is still lacking. In the Czech Republic or in the EU until now is no official document that would define FF and stated rules and conditions for the production of FF. However, there are series of regulations that closely related to the food of this species. In particular rules concerning to the labelling because each FF contains one or more health claims on the package that inform consumers about the beneficial effects on the human body (Ministerstvo zemědělství ČR, 2009). According to the EU regulation on nutrition and health claims made on foods (EC No. 1924/2006), a list of authorised claims has to be published for all member states, and nutrient profiles also has to be established for foods containing health claims (Siró et al., 2008). The aim of this regulation is to ensure the substances that have a beneficial nutritional and physiological effect by scientifically valid evidence. Another aim is to ensure the clarity of those allegations and to protect consumers from misleading claims. Currently, individual claims submitted by member states are examined by the European Food Safety Authority (EFSA). The result is a list of permitted claims in relation to a particular nutrient. For each new claim not included in the list, the manufacturer must apply EFSA for approval (Ministerstvo zemědělství ČR, 2009).

### **3. AIMS OF THE THESIS**

The general objective of the thesis was to determine consumer attitudes to dietary supplements and functional foods among Czech citizens.

The specific objectives were to find out which dietary supplements and functional food are used in the Czech Republic and to identify reasons for the use of dietary supplements and functional foods. Second specific objective was to determine consumer preferences in the purchase of dietary supplements and functional food products, whether in the purchase of the product plays an important role the price, composition or its form. Last, not least specific objective was to identify the “typical user” of dietary supplements and functional food products in the Czech Republic.

#### **Hypotheses:**

H1: Usage of dietary supplements and functional food is higher among educated people.

H2: Czech citizens with higher education are more interested in the composition of dietary supplements and functional food products.

H3: The Internet is the most common source of information concerning dietary supplements and functional food.

H4: Origin of the product is not the determining factor in the purchase.

## **4. METHODOLOGY**

Main sources of information- secondary data, for the purpose of this thesis, were represented by available literature, scientific papers, mainly published in scientific database ScienceDirect. Furthermore, reports made by the Agriculture and Agri-Food Canada were used in order to gather the most recent data about DS and FF consumption.

To get the answers to respective objectives the following data collection methods were used. Primary data were collected by a questionnaire survey which were distributed in person and via online survey to Czech consumers.

### **4.1. Data collection**

The target group of thesis are citizens of the Czech Republic who have Czech nationality. The data collection was implemented from 1st November 2015 to mid-March 2016, through distribution of questionnaire by interviewer and via online. Data were collected throughout the Czech Republic, to get the biggest data diversity as possible. Data collection was undertaken in cities Prague, Kladno, Poděbrady, Pilsen, Hradec Králové, Tábor and Uherské Hradiště. Furthermore, there was an effort to cover all age categories. The online questionnaire was developed using Google Forms. Web link on online questionnaire was sent by e-mails or distributed through social network Facebook where was shared a link to different groups dealing with healthy lifestyle or not. The sampling strategy was combination of random and non-random sample. Random samples were ensured by questioning people waiting on train stations, bus stops of public transport and in front of supermarkets. In the framework of my practical training in non-governmental organization ADRA, the data were also obtained by questioning the teachers in kindergartens and primary schools. Non-random samples were collected by snowball technique and convenience sampling via online data collection process.

## 4.2. Questionnaire design

After development of questionnaire, the pre-test was done with the cooperation of clients in the rehabilitation center in Slapy in October 2015. Recommendation for changes to question wording for the purpose to understand the questions were completed before the data collection. The questionnaire contained nineteen questions and was comprised of three section. Section 1 focused on the types of DS and FF use in the Czech Republic and health reasons for their use. Section 2 dedicated to consumer behaviour. Participants were asked if they are willing to use products originated or produce in different regions of the world and also were asked about preferences and interests due to DS and FF. Section 3 was oriented to collect information on sociodemographic characteristics, including gender, age, educational level, employment, residential area and net monthly income of household. The types of questions were mainly close-ended multiple choice without any preference ranking. In six questions was possible to add respondent's own note and in one question clarify his choice.

## 4.3. Data analysis

It was received 768 questionnaires, 12 of them were marked as not applicable for analysis due to the not filled questions. Overall, 756 questionnaire (in person 456, via online 300) were used to analyse.

Firstly, all the data were processed manually in MS Excel. Descriptive statistics such as percentage were used to describe the sample of various variables. In software STATISTICA were analysed dependence of qualitative characters using contingency table. The data were analysed using Pearson Chi-squared test to determine the association between consumer preferences and independent variables (education, residential area) and to evaluate a statistical significance with p-values set at 0.05.

## 5. RESULTS

Data collection was conducted throughout the Czech Republic which was specified in the methodology part of this thesis. In the following data analysis based on the questionnaires the 756 number is taken as a total, 100% amount. As it was mentioned in the methodology part, the survey was divided into three sections- consumption of DS and FF in the Czech Republic, consumer behaviour and personal characteristics.

### 5.1. Description of sample

Of the total 576 responses, 475 participants (62.8 %) who completed the full questionnaire were women. Table 2 outlines the sociodemographic characteristic variables of the respondents. The majority of participants were aged from 19 to 29 years, with university degree or with high school graduation. Participants were mainly employees living in Prague. Respondent's net income in household is from 30,001 to 50,000 CZK.

**Table 2:** Sociodemographic characteristics of the respondents

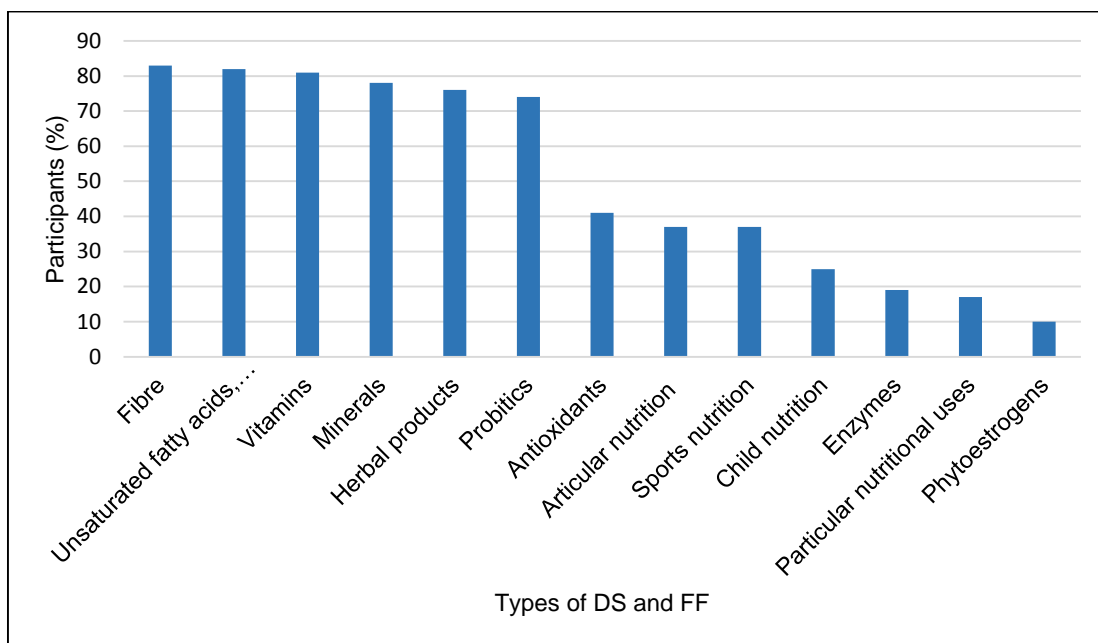
<b>Variables</b>	<b>Percentage of respondents</b>	<b>Total amount of respondents n=756</b>
<b>Gender</b>		
Female	62.8	475
Male	37.2	281
<b>Age</b>		
under 18 years	4.5	34
19-29 years	43.5	329
30-39 years	13.6	103
40-49 years	18.0	136
50-59 years	11.3	85
over 60 years	9.1	69
<b>Educational level</b>		
Primary	5.6	42
Vocational	5.4	41
Secondary	43.4	328
University	45.6	345
<b>Economic activity</b>		
Student	35.3	267
Employed	45.9	347
Entrepreneur	8.2	62
Unemployed	0.7	5

Senior	7.8	59
Maternity leave	2.1	16
<b>Residential area</b>		
under 10,000 inhabitants	20.4	154
10,001-50,000	11.5	87
50,001-100,000	8.6	65
100,001-1,000,000	10.4	79
1,000,001 and more	49.1	371
<b>Net income of household*</b>		
up to 6,000 CZK	4.8	36
6,001-8,000 CZK	4.4	33
8,001-10,000 CZK	5.3	40
10,001-15,000 CZK	9.2	69
15,001-20,000 CZK	11.5	86
20,001-30,000 CZK	20	150
30,001-50,000 CZK	29.2	219
over 50,001 CZK	15.6	117

\* Six participants hesitate to give the information.

## 5.2. Consumption of DS and FF products

Overall, 99 % of the participants (749) reported to have used different kinds of dietary supplements and functional foods and selected at least one dietary supplements or functional food which they use regularly or occasionally. The most popular DS/FF (Figure 1) was fibre with a prevalence of 83 % of respondents, followed by unsaturated fatty acids and plant sterols (82%), vitamins (81%), minerals (78%), herbal products (76%) and probiotics (74%).



**Figure 1:** Types of DS and FF use in the Czech Republic

It was considered that Czech citizens used fibre (48 % of the participants) and unsaturated fatty acids and plant sterols (47 %) on a regular basis. Vitamins, minerals, herbal products and probiotics are used occasionally, which reported almost 30 % of participants.

Prevalence of use DS and FF is distinct between genders. Generally, prevalence of use of DS and FF among women is higher than men. Women most commonly used fibre and unsaturated fatty acids and plant sterols, marked 89 % and 87 % of women respondents. Thereafter women used vitamins (81 %) and herbal products (63 %). While men preferred to use vitamins and fibre, 79 % and 72 % of men respondents, and then unsaturated fatty acids and plant sterols (72 %) and minerals (71 %).

According to age categories divided by gender, the most consumed product was fibre, which use mainly young people (under 18 years), women (95 %) and men (87 %) in age from 19 to 29 years. Women in age from 50 to 59 years (83 %) also used fibre together with unsaturated fatty acids and plant sterols. It was found that unsaturated fatty acids and plant sterols mainly consumed women in age from 40 to 49 years (92 %), from 50 to 59 years (83 %) and over 60 years (91 %). Vitamins were favoured by men in age from 30 to over 60 years (about 77 %). Mainly used DS among women aged 30-39 years (87 %) were herbal products.

Usage of DS and FF products was different in various places of residence of the respondents, specifically with regard to the most common DS/FF product. In Prague people mainly used fibre (94 %) and also unsaturated fatty acids and plant sterols and minerals. In cities with 100,001-1,000,000 inhabitants were most frequently used vitamins (84 %), unsaturated fatty acids and plant sterols, herbal products and fibre. In towns with 50,000-100,000 inhabitants was the mainly DS/FF product used vitamins (82 %) and unsaturated fatty acids and plant sterols, followed by herbal products, minerals and probiotics. Respondents living in towns with 10,000-50,000 inhabitants commonly used vitamins (90 %), then unsaturated fatty acids and plant sterols together with fibre. Small towns and villages showed the most common use of fibre (90 %), followed by unsaturated fatty acids and plant sterols and minerals.



The Pearson Chi-squared test was used to determine the association between use of DS and FF products and level of education,  $p\text{-value} \leq 0.05$  was considered to be statistically significant. Table 3 shows the independent association of level of education with specific DS/FF use, except for the use of sport nutrition products, fibre, child nutrition products and products for particular nutritional uses. For these products were found out  $p\text{-values} \leq 0.05$  and in this case, hypothesis n.1 that people with higher level of education use DS/FF was confirmed.

**Table 3:** Association between use of DS/FF and level of education

<b>Independent factor</b>	<b>Dietary supplement/Functional food</b>	<b>P-values</b>
Level of education	Antioxidants	0.07610
	Herbal products	0.15205
	Enzymes	0.22258
	Phytoestrogens	0.19273
	Articular nutrition	0.05004
	Minerals	0.77466
	Unsaturated fatty acids	0.75435
	Probiotics	0.14762
	Sports nutrition	<b>0.02265</b>
	Vitamins	0.22286
	Fibre	<b>0.02043</b>
	Child nutrition	<b>0.00559</b>
	Particular nutritional uses	<b>0.02842</b>

Table 4 outlines the most frequently reported reasons for use DS and FF. The main reason for use was to enhance immune system and defensive capacity. Frequently reported reason for use was also body's resistance against fatigue and stress and an improvement of mental activity and performance.

**Table 4:** Most common reasons for use DS and FF

<b>Health reason</b>	<b>Percentage of respondents</b>
Immune system and defensive capacity	75.3
Body's resistance against fatigue and stress	69.3
Mental activity and performance (concentration, memory)	52.4
Healthy skin, hair and nails	43.9
Gastrointestinal tract (activity of bowels, digestion, liver, gall bladder)	42.7
Musculoskeletal system (health and regeneration of joints, bones, tendons, muscles)	40.9
Physical and sport performance	38.4
Weight loss or control body weight	35.8
Healthy sleep and relaxation	31.1
Respiratory system (to facilitate coughing, clearing air passages)	30.6
Cardiovascular system (level of cholesterol, sugar, blood pressure, vascular health)	29.9
Excretory system (kidneys, bladder, urinary tract)	23.7
Ophthalmic health and support of eyesight	19.8
Reproductive and sexual health (prostate, fertility, sexual activity)	13.5
Premenstrual and menopausal comfort	12.2

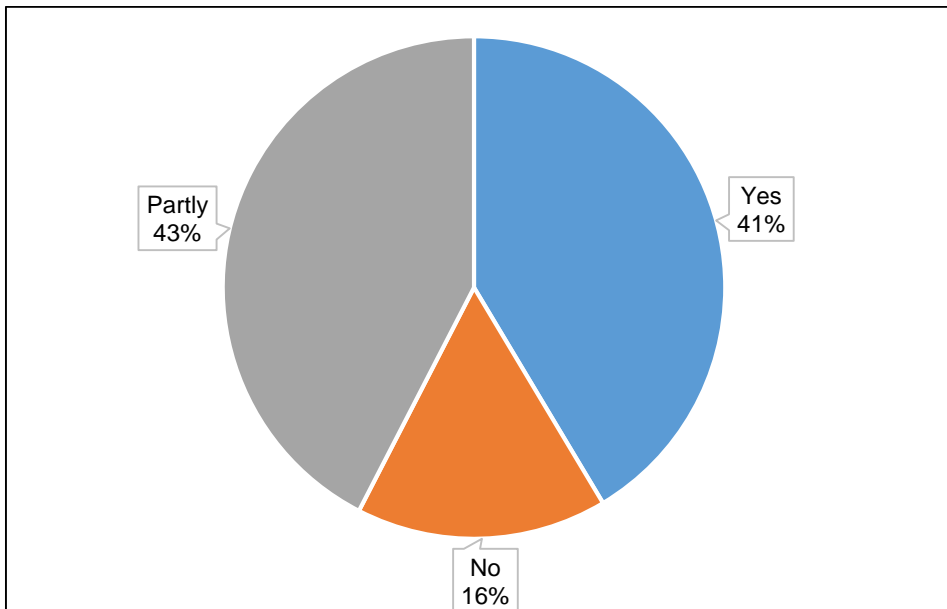
### 5.3. Consumer behaviour

Opening question of the questionnaire was whether Czech citizens are aware of the concept of dietary supplements or functional foods. 82 % of the respondents marked the option "Yes". Respondents mainly knew the term dietary supplement rather than functional food which I found out during data collection in person. 13 % of respondents selected the option "No" and remaining 5 % did not answer.

### 5.3.1. Composition of Dietary supplements and Functional foods

Overall 84 % of respondents were interested in composition of DS and FF (included responses “yes” and “partly”). Figure 2 shows the percentage distribution of responses.

Using Pearson Chi-squared test was analysed the association between interest in composition of DS/FF products and level of education,  $p\text{-value} \leq 0.05$  was considered to be statistically significant. P-value was determined at level 0.00000 and hypothesis n.2 was confirmed, Czech citizens with higher education level are more interested in the composition of DS and FF products than less educated users. Overall, 55.8 % of respondents with university degree marked options “Yes” and 49.1 % of high school graduates selected the option “Partly”.

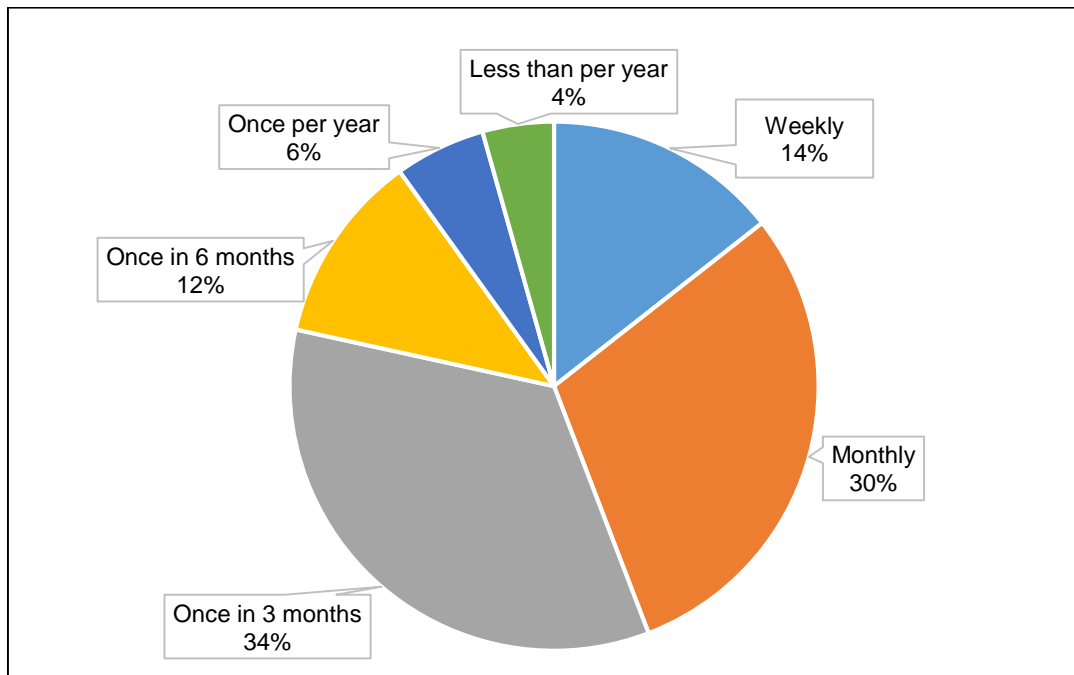


**Figure 2:** Interest in composition of DS and FF

It was found that Czech consumer preferred natural (92.5 %) rather than synthetic product and women (97.5 %) are more interested in this field than men (84 %).

### 5.3.2. Consumer purchase behaviour

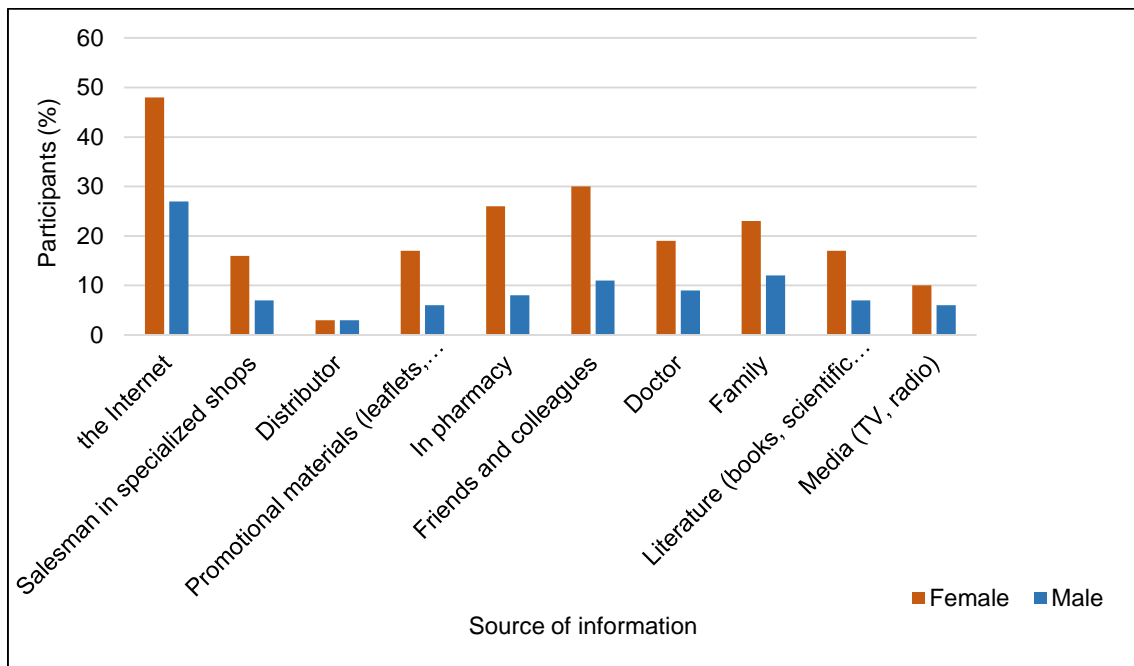
Most preferred forms of dietary supplements were capsules, pastilles, tablets and pills. In case of forms of functional foods participants preferred dairy products, oils, butter, eggs and pastry. On the question how often respondents buy DS and FF products (Figure 3), most frequently response was once in three months (34 % of respondents) and every month (30 % of respondents). Weekly bought these products 14 % of participants. It was found that the most common place of purchase is pharmacy (66 % of participants), followed by specialized shops (44 %) and supermarkets (35 %). Average spending on DS/FF per month was mainly less than 250 CZK (42 % of respondents), followed by amount from 250 to 499 CZK (32 % of respondents).



**Figure 3:** Frequency of purchase of DS and FF

### 5.3.3. Source of information on Dietary supplements and Functional foods

Based on descriptive statistics hypothesis n.3 was confirmed due to the determination that the Internet was major source of information on DS and FF in the Czech Republic (Figure 4). Participants also often marked as an important source of information group of friends and colleagues and family. According to gender distribution, the Internet was the most important source in both genders. Women also selected friends/colleagues and pharmacy as source of information, on the other hand, men chose family and friends/colleagues from offered options which could confirm that women are more interested in DS and FF products and take care of the family health.

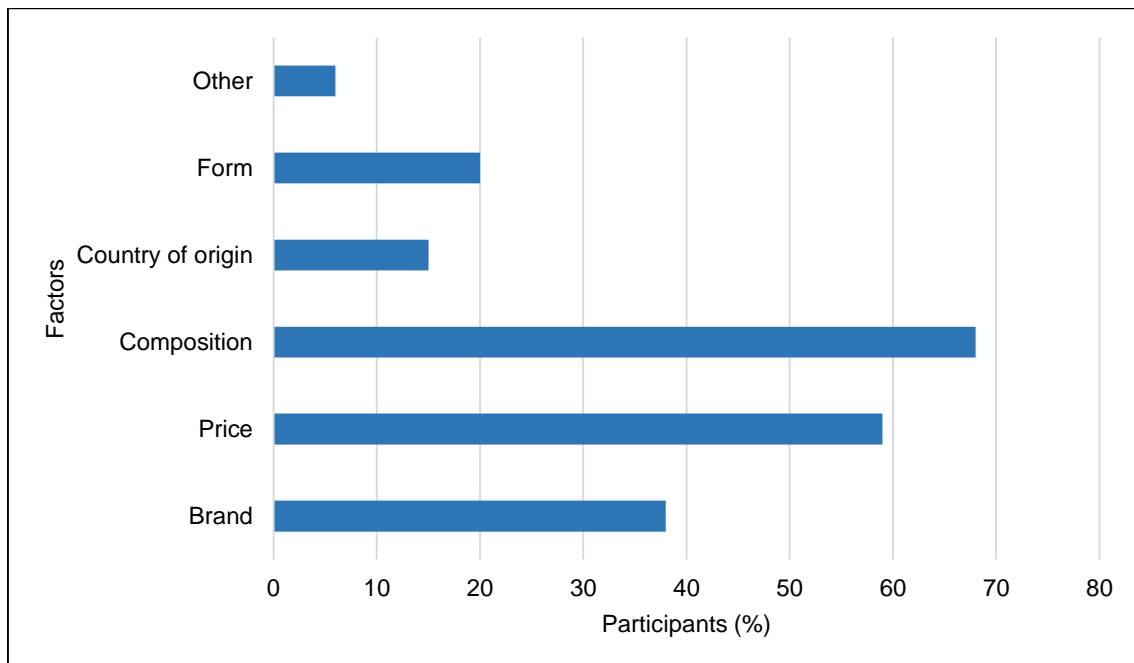


**Figure 4:** Most important source of information on DS/FF by the participants

Pearson Chi-squared test was conducted to identify the relation between source of information on DS/FF and the residential area,  $p\text{-value} \leq 0.05$  was considered to be statistically significant. Statistical analysis did not confirm the dependency between variables,  $p\text{-value}$  got at 0.32091. Source of information on composition of DS and FF is not depend on residential area.

### 5.3.4. Factors in decision on purchase of Dietary supplements and Functional foods

The main decisive factor in the purchase of DS and FF is composition of the product which marked 68 % of respondents. One of the determining factors were price (59 %) and brand of the product (38 %). Origin of the product was not defined as an important factor in the purchase. More important factor than country of origin was determined the form of DS and FF. (Figure 5). Due to this fact, hypothesis n.4 cannot be rejected. Group “Other” included responses such as recommendation, experiences, function and quality.



**Figure 5:** Factors in decision on purchase of DS and FF products

Questions related to favoured forms of DS/FF, source of information about DS/FF, determining factors in purchase and place of purchase were multi-choice and respondents selected at least one answer.

### **5.3.5. Place of origin and production of Dietary supplements and Functional foods**

It was found that 71 % of participants did not know the place of origin or production of DS/FF products, the remaining 29 % of participants mainly use DS and FF produced in EU, also in the United States, Canada and in developing countries, namely India, Nepal and Mexico. From tropical areas respondents were willing to use DS/FF mainly originated and finally produced in Australia and Oceania. Respondents were also willing to use products originated from South America and Asia, on the other hand more preferred are products manufactured in South America rather than in Asia. The smallest interest was noticed on products originating or made in Africa.

## 6. DISCUSSION

The data show a high prevalence of DS and FF products among Czech citizens. Previous surveys conducted in the Czech Republic also showed high usage of DS and FF. Trčková (2011) found out that 66.7 % of respondents used DS and foods for particular nutritional uses. 97 % of respondents reported that they knew the concept of DS and food for particular uses. During the data collection in person was evident that people know the concept of dietary supplement rather than functional foods. After giving an example of FF products they realized their use. Zídková (2013) observed that 89 % of respondents did not know the term “functional food” but 66 % of them knew the foods that have preventive effects against various diseases. Consumers do not know the term, they know the benefits from use (Annunziata and Vecchio, 2010). Possible reason for lack of awareness is no official document that would define FF and stated rules and conditions for the production of FF. Use of fibre and unsaturated fatty acids and plant sterols is not so significant as taking vitamins and minerals (Trčková, 2011). In this study, 83 % and 82 % of participants reported the use of fibre and unsaturated fatty acids and plant sterols. This fact is due to the trend that Czech citizens increasingly live the healthy lifestyle and want to prevent serious diseases, such as colon cancer which is the second most common cancer in the Czech Republic (Kolarektální-karcinom, 2014). The prevalence of usage these products is significant in women aged from 40 to over 60 years.

In this study, 99 % of participants reported the use different kinds of DS and FF. Most frequently reported DS and FF were fibre, unsaturated fatty acids and plant sterols, vitamins, minerals, herbal products and probiotics. These results are more closely linked to the prevalence from other developed countries, with the difference that in other developed countries prevails consumption of vitamins (Rovira et al., 2013; Timbo et al., 2006; Ten Hoeve, 2011; Barnes et al., 2016; Gahche et al., 2011; Bailey et al., 2011; Pietruzka and Brzozowska, 1999). Data on consumption of DS and FF vary widely. Studies estimate that at least 30 % of Americans use vitamin and mineral supplements regularly (Fairfield and Fletcher, 2002). Approximately 33 % of American adults use at least one non-vitamin and/or non-mineral supplement regularly (Schaffer et al., 2003). Annunziata and Vecchio (2011) found out that 15 % of Italian consumers include FF in



their diet every day. This study estimates that Czech citizens use fibre (48 %) and unsaturated fatty acids and plant sterols (47 %) on a regular basis. Vitamins, minerals, herbal products which belong to the main DS and FF use in the Czech Republic, are used occasionally, which reported almost 30 % of participants. Prevalence of use DS and FF among participants from Prague and other towns in the Czech Republic is similar. There is no difference between consumption of DS and FF in Prague or in the village, except the most frequently used product. Pietruzka and Brzozowska (1999) reported that the supplement use was more frequent among respondents from the capital city and small towns than from villages.

Use of DS and FF is higher among women (Rovira et al., 2013; Timbo et al., 2006; Gahche et al., 2011; Pietruszka and Brzozowska, 1999; Buurma-Rethans, 2012; Van der Horst and Siegrist, 2011, Ares and Gámbaro, 2007). Data of this study show the same trend. One of the identical result from researches (Bech-Larsen and Scholderer, 2003; Frewer et al., 2003) is that consumer's orientation related to health differs, consistently, according to gender and age. Women tend to be slightly oriented to health than men. According to Frewer et al. (2003), the main reason for women being aware about health relates to their sense of responsibility to the family welfare, also women have got the dominant role on family food acquisition.

Many studies claim that the level of education affects the using of DS and FF. Ocké et al. (2005); Pietruzka and Brzozowska (1999); Bailey et al. (2011) declared that the number of DS and FF users increased with a rise in educational level. In this study, the claim was confirmed only for usage the products containing fibre, sport and child nutrition products and products for particular nutritional uses. For the remaining groups of DS and FF the consumption of the product is not dependent on level of education. Interesting detection about effects of education on respondents FF gave researchers Urala and Lähteenmäki (2004). They found out that respondents who had university degree education have positive attitudes towards FF that could be used for the same purposes as medicine. However, they do not use FF as a part of a normal healthy diet. This fact does not correspond with mentioned studies.

General reason for use DS and FF is to maintain health or to improve overall health (Barnes et al., 2016; Bailey et al., 2011). Additional reasons among consumers in US are to ensure general health and nutrition, to improve athletic performance and to enhance personal appearance (Vincent and Furnham, 1996; Ernst, 2002). Study among dietitians in the Netherlands show that prevention of a health condition is major reason for use DS, 64 % of participants. 60 % respondents reported using DS for treatment of a health condition and 44 % use DS to enhance physical or mental activity. 42 % of participants often recommended DS as prevention a health conditions to others (Ten Hoeve, 2011). Researchers (Ayranci et al., 2005) concerned on prevalence of non-vitamin, non-mineral supplements usage among students in a Turkish university show that the main reasons for use these products is to improve energy and vitality (78 %), to promote weight loss (71 %), to enhance the athletic performance (64 %) and to slowdown the onset of aging (63%). In case of FF, 75 % of US consumers believe that food and nutrition play the greatest role in maintaining or improving health (IFIC, 2007) and 23 % of Italian consumer used these products to improve personal well-being, also to reinforce immune system (18 %) and 15 % of consumers selected reason to improve the gastrointestinal functions (Annunziata and Vecchio, 2010). In Canada, main reason for using is to enhance digestive health (CCFN, 2008). Main reported reason for use DS and FF in this study was to enhance immune system and defensive capacity (75 % of participants), followed by support the body's resistance against fatigue and stress (69 %). To support mental activity and performance selected 52 % of participants. The need to enhance personal appearance which include skin care and hair care selected 43 % of participants. Improvement of gastrointestinal tract was determined as reason for use by 42 % of respondents.

Many studies reported that the most popular form of FF is yogurt (Annunziata and Vecchio, 2010; 2011; 2013; Hailu et al., 2009). Generally, the most commonly used are dairy products, 56 % of consumers use it for bone health (IFIC, 2007). In Japan, fermented milk products are used for health reason by 80 % of consumers (Agriculture and Agri-Food Canada, 2013). Dean et al. (2007) noted that gender influences the using of various forms of FF. Men perceived more benefits in cholesterol-lowering bread then women. However, women perceived more benefits in fibre-added bread and fibre-added pasta. Van Kleef et al. (2005) found that margarine, yogurt, brown bread and pills were rated as

tempting FF carriers rather than chewing gum, ice cream and chocolate. In comparison mentioned results with the results of this study can be stated the same trend. Czech citizens mainly prefer dairy products, followed by group of oils, butter, eggs and pastry. The least preferred form of FF are sweets with artificial sweetener. In case of DS people prefer forms such as capsules, pastilles, tablets and pills. These preferences are in accordance with the results in the Netherlands where consumers prefer DS in form of tablets, capsules and coated tablets (Ocké, 2005).

In this study was found that 66 % of participants most frequently buy DS/FF in pharmacies, 44 % in specializes shops and 35 % in the supermarkets. Through e-shop makes a purchase 28 % of the respondents. At least Czech citizens buy from the distributor. In US consumers purchase supplements mainly through mass merchandisers (41 %), also buy DS in pharmacies/drug stores (34 %) and in the supermarkets (23 %). Only 12 % of consumer buy these products via web-based retailer (CRN, 2014). Annunziata and Vecchio (2010) reflected that in 83 % of cases Italian consumer bought FF at modern distribution chain outlets, such as supermarkets and hypermarkets. This trend is also reflected in FF market in Brazil (Agriculture and Agri-Food Canada, 2013). Generally, based on the above cited studies, DS are mainly purchased in pharmacies and FF in supermarkets.

Factors that influence the decision to buy DS and FF are varied and unique in different countries. In Canada, the most influential drivers of FF choice were the composition and country of origin of the product (CCFN, 2008). Nevertheless, the origin of the product is not the determining factor in purchase among Czech citizens and Italian consumers as well (Annunziata and Vecchio, 2010). Another study from Canada determined mode of delivery (40 %), health claims (23 %), cost (19 %) and source of health claim information as important attributes (Hailu et al., 2009). Based on the results, the determining factor in purchase is primarily composition, second important factor is price and then brand which Annunziata and Vecchio (2013) reported as second most important attribute after base of product. Further often reflected factors are taste of products, nutritional aspects (Annunziata and Vecchio, 2010) and also health problems and doctor's recommendation (Pietruzska and Brzozowska, 1999).

Searches for information on health are one of the most common reasons that consumers used the Internet, 80 % of American Internet users have searched for health information (PewResearchCenter, 2003). IFIC (2007) reported that the top sources of health and nutrition information are media, medical sources and friends with family. In this study was the major source of information the Internet (75 % of participants) which agrees with the results in US. Family and friends are perceived as important sources of information, more than media and physicians. In Italy, advertising (32%) plays an important role in the transfer of information, second (27 %) is reading product labels, 15 % of respondents marked doctor as a main source of information on DS and FF. However, the Internet is used only by 6 % of respondents (Annunziata and Vecchio, 2010). Based on the results of this thesis was found that the most common place of purchase is pharmacy but Czech citizens mostly search information on DS and FF on the Internet and only 34 % of respondents (mainly women) get advice from the pharmacist.

This thesis is not without limitations. This study is the first to investigate the consumption, reasons for use and consumer behaviour of dietary supplements and functional food among Czech citizens. However, other scientific papers and studies are always oriented only on one specific group, dietary supplement or functional food. Also no specification of used product (yogurt, wholegrain pasta, tea etc.) can be seen as a limitations.

In this study are reported types of DS or FF, reasons for the use but there is no information on lifestyle factors, such as physical activity, smoking or alcohol consumption, which may have affected the prevalence of use. One of the limitations is also data collection via online because there is no contact with the interviewer and this fact can lead to some misunderstanding in filling the questionnaire. Another limitation is that the data collection was implemented during winter period when people have weakened immunity and dietary supplement intake increases, which can influence the results of prevalence. Furthermore, the large proportions of participants aged between 19 to 29 years and with university degree may have influenced the results.

## 7. CONCLUSION

The findings of the thesis showed a high prevalence of dietary supplements and functional food in the Czech Republic, similar to those reported in other developed countries.

The typical user of dietary supplements and functional foods was woman with university education status, aged between 19-29 years, from Prague. It was observed that the most popular DS/FF is fibre, followed by unsaturated fatty acids and plant sterols. These types of products consumer used on a regular basis. Vitamins, minerals, herbal products and probiotics were used occasionally. Women used DS and FF more than men. It was examined that usage of DS/FF products is not depend on level of education, except products contained fibre, sports and child nutrition products and products for particular uses. The main reported reason for using DS and FF was to enhance immune system and defensive capacity and to support body's resistance against fatigue and stress. Czech citizens were most interested in composition of these products and preferred natural products. In most cases was frequency of purchase one per three months. Preferred forms of DS were capsules, pastilles, tablets and pills, popular forms of FF were dairy products, oils, butter, eggs and pastry. People mostly bought these products in pharmacy and on average monthly spent less than 250 CZK. Determining factor in purchase was mainly composition. This fact corresponded with the interest in composition. Consumers were also influenced by price and brand. Origin of the product was not the determining factor in purchase which connected with the reality that most Czech citizens did not know the place of origin or produce of DS and FF products. Information on DS and FF Czech consumers searched first of all on the Internet. Family and friends were reported as further sources of information.

To overall conclude the study on the topic of consumption of dietary supplements and functional foods in the Czech Republic, the important and useful data were collected. However, there is a possibility for future research on this topic which is nowadays more and more actual due to the interest in healthy diet. To recommend the direction of those researchers, for example deeper analyse of dietary supplements and functional foods consumption, each separately and focus on specific product use.

## 8. REFERENCES

- Agriculture and Agri-Food Canada. 2010. The Canadian Consumer-Behaviour, Attitudes and Perceptions toward Food Products. Ottawa: Agriculture and Agri-Food Canada. 19p.
- Agriculture and Agri-Food Canada. 2011. Health and Wellness Trends in Russia. Available at <http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-region/europe/market-intelligence/health-and-wellness-trends-in-russia/?id=1410083148591>: Accessed 2016-03-18.
- Agriculture and Agri-Food Canada. 2013. Fortified/Functional Foods and Beverages in Brazil. Ottawa: Agriculture and Agri-Food Canada. 13p.
- Agriculture and Agri-Food Canada. 2013. The Japanese Consumer Behaviour, Attitudes and Perceptions toward Food Products. Ottawa: Agriculture and Agri-Food Canada. 15p.
- Agriculture and Agri-Food Canada. 2014. Fortified/Functional Foods in China. Ottawa: Agriculture and Agri-Food Canada. 8p.
- Agriculture and Agri-Food Canada. 2015. Opportunities and Challenges Facing the Canadian Functional Foods and Natural Health Products Sector. Available at <http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/functional-foods-and-natural-health-products/reports-and-resources-functional-foods-and-natural-health-products/opportunities-and-challenges-facing-the-canadian-functional-foods-and-natural-health-products-sector/?id=1410206902299>: Accessed 2016-03-18.
- Alzamora SM, Salvatori D, Tapia SM, López-Malo A, Welti-Chanes J, Fito P. 2005. Novel functional foods from vegetable matrices impregnated with biologically active compounds. *Journal of Food Engineering* 67: 205-214.

- Annunziata A, Vecchio R. 2010. Italian Consumer Attitudes Toward Products for Well-being: The Functional Foods Market. *International Food and Agribusiness Management Review* 13: 19-50.
- Annunziata A, Vecchio R. 2011. Factors Affecting Italian Consumer Attitudes Toward Functional Foods. *AgBioForum* 14: 20-32.
- Annunziata A, Vecchio R. 2013. Consumer perception of functional foods: A conjoint analysis with probiotics. *Food Quality and Preference* 28. 348-355.
- Ares G, Gámbaro A. 2007. Influence of gender, age and motives underlying food choice on perceived healthiness and willingness to try functional foods. *Appetite* 49: 148-158.
- Ayranci U, Son N, Son O. 2005. Prevalence of nonvitamin, nonmineral supplement usage among students in a Turkish university. *BMC Public Health* 5: 47.
- Bailey RL, Gahche JJ, Lentino CV et al. 2011. Dietary Supplement Use in the United States, 2003-2006. *The Journal of Nutrition* 141:261-266.
- Bailey RL, Gahche JJ, Miller PE, Thomas PR, Dwyer JT. 2013. Why US Adults Use Dietary Supplements. *JAMA Internal Medicine* 5: 355-361.
- Barcellos MD, Lionello RL. 2011. Consumer Market for Functional Foods in South Brazil. *International Journal on Food System Dynamics* 2: 126-144.
- Barnes K, Ball L, Desbrow B, Alsharairi N, Ahmed F. 2016. Consumption and reasons for use of dietary supplements in an Australian university population. *Nutrition* 32: 524-530.
- Baumann M. 2009. *Doplňky stravy [BSc.]*. Brno: Masarykova univerzita. 76p.

- Bech-Larsen T, Scholderer J. 2007. Functional foods in Europe: consumer research, market experiences and regulatory aspects. *Trends in Food Science & Technology* 18: 231-234.
- Bigliardi B, Galati F. 2013. Innovation trends in the food industry: The case of functional foods. *Trends in Food Science & Technology*: 118-129.
- Buurma-Rethans E. 2012. Dietary supplements use in The Netherlands. Bilthoven: National Institute for Public Health and the Environment. 16p.
- Council for Responsible Nutrition. 2014. Consumer Survey on Dietary Supplements. Available at <http://www.crnusa.org/CRNconsumersurvey/2014/>: Accessed 2016-02-13.
- Daxueconsulting. 2015. Vitamins and dietary supplements in China. Available at <http://daxueconsulting.com/vitamins-dietary-supplements-china/>: Accessed 2016-02-13.
- Dean M, Shepherd R, Arvola A, Vassallo M, Winkelmann M, Claupein E, Lähteenmäki L, Raats MM, Saba A. 2007. Consumer perceptions of healthy cereals products and production methods. *Journal of Cereal Science* 46: 188-196.
- Ernst E. 2002. The Risk-Benefit Profile of Commonly Used Herbal Therapies: Ginkgo, St. John's Wort, Ginseng, Echinacea, Saw Palmetto, and Kava. *Annals of Internal Medicine* 136: 42-53.
- Euromonitor International. 2015. Vitamins and Dietary Supplements in Poland. Available at <http://www.euromonitor.com/vitamins-and-dietary-supplements-in-poland/report>: Accessed 2016-02-14.
- European Food Information Council. 2006. Functional Foods. Available at <http://www.eufic.org/article/en/nutrition/functional-foods/expid/basics-functional-foods/>: Accessed 2016-03-18.



- European Food Safety Authority. 2015. Food Supplements. Available at <http://www.efsa.europa.eu/en/topics/topic/supplements>: Accessed 2015-11-05.
- Fairfield KM, Fletcher RH. 2002. Vitamins for chronic disease prevention in adults: scientific review. *Journal of the American Medical Association* 287: 3116-3126.
- Food Insight. 2011. Functional Food. Washington, DC: International Food Information Council Foundation. 8p.
- FOODNavigator-asia.com. 2011. Chinese functional beverage market growing by 29%. Available at <http://www.foodnavigator-asia.com/Markets/Chinese-functional-beverage-market-growing-by-29>: Accessed 2016-03-18.
- Frewer L, Scholderer J, Lambert N. 2003. Consumer acceptance of functional foods: issues for the Future. *British Food Journal* 10: 714–731.
- Gahche JJ, Bailey RL, Burt V et al. 2011. Dietary supplement use among U.S. adults has increased since NHANES III (1988–1994). Hyattsville, MD: National Center for Health Statistics. 7p.
- Hailu G, Boecker A, Henson S, Cranfield J. 2009. Consumer valuation of functional foods and nutraceuticals in Canada. A conjoint study using probiotics. *Appetite* 52: 257-265.
- International Food Information Council Foundation. 2007. Consumer Attitudes Toward Functional Foods/Foods for Health. Washington, DC: International Food Information Council Foundation. 16p.
- International Food Information Council Foundation. 2011. Functional Food. Washington, DC: International Food Information Council Foundation. 8p.
- Jerger C. 2012. Brazil's Food and Beverage Market. Zürich: Osec. 77p.

- Khan RS, Grigor J, Winger R, Win A. 2013. Functional food product development- Opportunities and challenges for food manufacturers. *Trends in Food Science & Technology* 30: 27-37.
- Kolorektální-karcinom.cz. 2016. Novinky pro laiky. Available at <http://www.kolorektalni-karcinom.cz/novinky-laik/ceska-republika-drzi-smutne-evropske-prvenstvi-103>: Accessed 2016-04-18.
- Kotilainen L, Rajalahti R, Ragasa C, Pehu E. 2006. *Health Enhancing Foods*. Washington, DC: The World Bank. 82p.
- Lieberman HR, Marriott BP, Williams C, Judelson DA, Glickman EL, Geiselman PJ, Dotson L, Mahoney CR. 2015. Patterns of dietary supplements use among college students. *Clinical Nutrition* 34: 976-985.
- Mark-Herbert C. 2004. Innovation of a new product category-Functional foods. *Technovation* 24: 713-719.
- Menrad K. 2003. Market and marketing of functional food in Europe. *Journal of Food Engineering* 56: 181-188.
- Michalová I. 2007. *Doplňky stravy (Potraviny k doplnění jídelníčku)*. Praha: Sdružení českých spotřebitelů, o.s. 35p.
- Ministerstvo zemědělství ČR. 2009. *Funkční potraviny a legislativa*. Available at <http://www.bezpecnostpotravin.cz/funkcni-potraviny-a-legislativa.aspx>: Accessed 2016-03-18.
- Motlová T. 2008. *Analýza prvků v potravních doplňcích [BSc.]*. Brno: Vysoké učení technické v Brně. 44p.

- Neves DBJ, Caldas ED. 2015. Dietary supplements: International legal framework and adulteration profiles, and characteristics of products on the Brazilian clandestine market. *Regulatory Toxicology and Pharmacology* 73: 93-104.
- Niva M. 2007. “All foods affect health”: Understanding of functional foods and healthy eating among health- oriented Finns. *Appetite* 48: 384-393.
- Ocké MC, Buurma-Rethans EJM, Fransen HP. 2005. Dietary supplement use in the Netherlands-Current data and recommendations for future assessment. Bilthoven: Centre for Nutrition and Health. 113p.
- Petroczi A, Taylor G, Naughton DP. 2011. Mission impossible? Regulatory and enforcement issues to ensure safety of dietary supplements. *Food and Chemical Toxicology* 49: 393-402.
- PewResearchCenter. 2003. Americans Search Online for Mental Health, Insurance, and Drug Information. Available at <http://www.pewinternet.org/2003/07/16/americans-search-online-for-mental-health-insurance-and-drug-information/>: Accessed 2016-04-19.
- Pietruszka B, Brzozowska A. 1999. Vitamin and Mineral supplement use among adult in Central and Eastern Poland. *Nutrition Research* 6: 817-826.
- Roberfroid MB. 2002. Global view on functional foods: European perspectives. *British Journal of Nutrition* 88: 133-138.
- Rovira MA, Grau M, Castañer O, Covas MI, Schröder H. 2013. Dietary Supplement Use and Health-Related Behaviors in a Mediterranean Population. *Journal of Nutrition Education and Behavior* 45: 387-391.
- Schaffer DM, Gordon NP, Jensen CD. 2003. Nonvitamin, nonmineral supplement use over a 12-month period by adult members of a large health maintenance organization. *Journal of the American Medical Association* 103:1500–1505.

- Siegrist M, Shi J, Giusto A, Hartmann C. 2015. Worlds apart. Consumer acceptance of functional foods and beverages in Germany and China. *Appetite* 92: 87-93.
- Siró I, Kápolna E, Kápolna B, Lugasi A. 2008. Functional food. Product development, marketing and consumer acceptance- A review. *Appetite* 51: 456-467.
- SlideShare. 2013. Entry into the Chinese health food market. Available at <http://www.slideshare.net/Adrienna/entry-into-the-chinese-health-food-market-2013>: Accessed 2016-02-13.
- Sloan AE. 2000. The top ten functional food trends. *Food Technology* 54: 33-62.
- Spence JT. 2006. Challenges related to the composition of functional foods. *Journal of Food Composition and Analysis* 19: 4-6.
- Státní ústav pro kontrolu léčiv. 2010. Rozlišení doplňků stravy od léčivých přípravků. Available at <http://www.sukl.cz/leciva/rozliseni-doplнку-stravy-od-lecivych-pripravku>: Accessed 2016-03-17.
- Szakály Z, Szenté V, Kövér G, Polereczki Z, Szigeti O. 2012. The influence of lifestyle on health behavior and preference for functional foods. *Appetite* 58: 406-413.
- Ten Hoeve AL. 2011. Dietitians in the Netherlands and dietary supplements: Practices, personal use and beliefs. *International Journal of Nutrition and Metabolism* 3: 11-16.
- The Canadian Council of Food and Nutrition. 2008. *Tracking Nutrition Trends VII*. Mississauga: CCFN. 86p.
- Timbo BB, Ross MP, McCarthy PV, Lin CJ. 2006. Dietary Supplements in a National Survey: Prevalence of Use and Reports of Adverse Events. *Journal of the American Dietetic Association* 106: 1966-1974.

- Trčková E. 2011. Kvantifikace využití potravních doplňků, doplňků stravy a potravin pro zvláštní výživu u populace v ČR [MSc.]. Zlín: Univerzita Tomáše Bati ve Zlíně. 122p.
- Urala N, Lähteenmäki L. 2004. Attitudes behind consumer's willingness to use functional foods. *Food Quality and Preference* 15:793-803.
- US Food and Drug Administration. 2016. Dietary Supplements: What You Need to Know. Available at <http://www.fda.gov/Food/DietarySupplements/UsingDietarySupplements/ucm109760.htm>: Accessed 2016-03-17.
- Van der Horst K, Siegrist M. 2011. Vitamin and mineral supplement users. Do they have healthy or unhealthy dietary behaviours? *Appetite* 57: 758-764.
- Van Kleef E, Van Trijp HCM, Luning P. 2005. Functional Foods: health claim-food product compatibility and the impact of health claim framing on consumer evaluation. *Appetite* 44. 299-308.
- Vincent C, Furnham A. 1996. Why do Patients Turn to Complementary Medicine? An Empirical Study. *British Journal of Clinical Psychology* 35: 37-48.
- Zídková J. 2013. Funkční potraviny a jejich uplatnění na regionálním trhu potravin [MSc.]. České Budějovice: Jihočeská univerzita v Českých Budějovicích. 71p.

# **APPENDICES**

## List of appendices

**Appendix No 1-** Questionnaire- Czech original

**Appendix No 2-** Questionnaire- English version

**Appendix No 3-** Statistical analysis- Association between interest in composition of DS and FF and level of education

**Appendix No 4-** Statistical analysis- Association between source of information and residential area

**Appendix No 5-** Statistical analysis- Association between use of each DS and FF and level of education

## Appendix No 1- Questionnaire- Czech original

Dotazník na spotřebitelské chování při nákupu doplňků stravy a funkčních potravin v České republice

Úvodní otázka:

Znáte pojem doplněk stravy či funkční potravina? Ano x Ne

1. Které doplňky stravy a funkční potraviny užíváte?

Pravidelně Občas Nepoužívám

	Pravidelně	Občas	Nepoužívám
<b>Antioxidanty</b> (např. extrakt z vinné révy-resveratrol, extrakt ze zeleného čaje, koenzym Q10)			
<b>Bylinné produkty</b> (např. bylinné extrakty a čaje, extrakt z Echinacea, Ginkgo, Aloe vera)			
<b>Enzymy</b> (papain, bromelain, preparáty např. Wobenzym, Phlogenzym)			
<b>Fytoestrogeny</b> (kapsle nebo tablety používané při menopauze)			
<b>Kloubní výživa</b> (např. želatina, glukosamin, chondroitin, atd.)			
<b>Minerály</b> (např. vápník, hořčík, draslík, železo, sůl s přídavkem jodu, atd.)			
<b>Nenasycené mastné kyseliny a fytoosteroly</b> (např. omega-3 a omega-6 nenasycené mastné kyseliny, produkty typu: Flora pro activ, Rama, Bio vejce, olej slunečnicový, lněný, olivový)			
<b>Probiotika</b> (např. zákys, Actimel, Activia, kefirové mléko, acidofilní mléko) a <b>Prebiotika</b> (např. Lactulosa)			
<b>Sportovní výživa</b> (např. iontové nápoje, proteiny, aminokyseliny, sacharidové gainery, atd.)			
<b>Vitamíny</b> (např. kyselina listová, vitamín A, B, C, D, E, K, karoteny)			
<b>Vláknina</b> (např. grahamový chléb, celozrnné pečivo, ovesné vločky, müsli, Psyllium)			
<b>Dětská výživa</b> (kojenecká výživa Nutrilon, Beba, příkrmy Hami, přesnídávky)			
<b>Potraviny pro zvláštní výživu</b> (pro diabetiky, pro osoby trpící nesnášenlivostí lepku, laktosy)			
<b>Jiné</b> (specifikujte):			

2. Z jakého důvodu doplňky stravy a funkční potraviny užíváte: Podpora:

Ano Ne

Hubnutí či kontrola tělesné hmotnosti		
Oční zdraví a podpora zraku		
Odolnost organismu proti únavě a stresu		
Duševní aktivita a výkonnost (koncentrace, paměť atd.)		
Dýchací systém (usnadnění vykašlávání, uvolnění dýchacích cest)		
Fyzická a sportovní výkonnost		
Gastrointestinální trakt (činnost střev, trávení, jater, žlučníku atd.)		
Imunitní systém a obranyschopnost		
Kardiovaskulární systém (hladina cholesterolu, cukru, krevní tlak, cévní zdraví)		
Pohybový aparát (zdraví a regenerace kloubů, kostí, šlach, svalů)		
Reprodukční systém a sexuální zdraví (prostata, plodnost, sex.aktivita)		
Vylučovací soustava (ledviny, močový měchýř, močové cesty atd.)		
Zdraví pokožky, vlasů a nehtů		
Premenstruační a menopauzální komfort		
Zdravý spánek a relaxace		
Jiné (specifikujte):		

3. Znáte původ či místo výroby produktů, které užíváte? Pokud ano, specifikujte:

- Ano,  
 Ne

4. Byl/a byste ochoten/a užívat produkty, které byly vyrobeny či pochází z těchto region?  
 Prosím vyberte:

<b>Původ</b>	Ano	Ne
Afrika		
Stř. a J Amerika		
Asie		
Austrálie, Oceánie		
Evropa		
S Amerika		

<b>Vyrobeno</b>	Ano	Ne
Afrika		
Stř. A J Amerika		
Asie		
Austrálie, Oceánie		
Evropa		
S Amerika		



5. Zajímáte se o složení těchto produktů?

- Ano
- Ne
- Částečně

6. Preferujete více přírodní produkty či syntetické?

- Přírodní
- Syntetické

7. Jak často nakupujete produkty?

- Každý týden
- Každý měsíc
- Jednou za čtvrt roku
- Jednou za půl roku
- Jednou za rok
- Méně než jednou za rok

8. V jaké formě preferujete doplňky stravy?

- Kapsle, tobolky, pastilky
- Tablety
- Pilulky
- Sáčky s práškem
- Ampulky s tekutinou
- Kapky
- Jiné:

9. V jaké formě preferujete funkční potraviny?

- Mléčné výrobky
- Pečivo
- Oleje, másla, vejce
- Soli
- Sušená mléka, kaše (dětská výživa)
- Sladkosti s umělým sladidlem
- Jiné:

10. Jak získáváte informace ohledně doplňků stravy/funkčních potravin?

- Internet
- Prodejci ve specializovaných prodejnách
- Distributor
- Propagační materiály (letáky, brožury, atd.)
- V lékárně
- Přátelé či kolegové
- Lékař
- Rodina
- Literatura (knihy, odborné časopisy)
- Média (TV, rádio)

11. Podle čeho se rozhodujete o koupi doplňků stravy/funkčních potravin?

- Značka
- Cena
- Složení
- Země původu
- Forma (kapky, kapsle...)
- Jiný důvod, prosím uveďte:

12. Kde nejčastěji doplňky stravy/funkční potraviny nakupujete?

- Specializované obchody
- Supermarkety
- Distributoři
- Lékárna
- E-shop
- Jiné, prosím uveďte:

13. Kolik peněz průměrně měsíčně utratíte za doplňky stravy/funkční potraviny?

- Méně než 250 Kč
- 250-499 Kč
- 500-999 Kč
- 1000-1999 Kč
- 2000 Kč a více

Osobnostní otázky:

14. Pohlaví:

- Žena
- Muž

15. Nejvyšší dosažené vzdělání:

- Základní
- Vyučen
- Maturita
- Vysokoškolské

16. Věk (vyberte prosím příslušnou věkovou kategorii):

- Do 18 let
- 19-29
- 30-39
- 40-49
- 50-59
- 60 a více

17. Ekonomická aktivita:

- Student
- Zaměstnaný
- OSVČ
- Nezaměstnaný
- Důchodce
- Na mateřské dovolené

18. Kde žijete Město/vesnice s počtem obyvatel:

- Do 10 000 obyvatel
- 10 001-50 000
- 50 001-100 000
- 100 001-1 000 000
- 1 000 001 a více

19. Jaký je **čistý měsíční příjem** Vaší domácnosti?

- Do 6 000 Kč
- 6 001-8 000
- 8 001-10 000
- 10 001-15 000
- 15 001-20 000
- 20 001-30 000
- 30 001-50 000
- 50 001 a více

## Appendix No 2- Questionnaire- English version

Questionnaire on consumer behaviour when purchasing dietary supplements and functional foods in the Czech Republic

Opening question:

Do you know the term dietary supplements of functional foods? Yes x No

1. Which dietary supplements and functional foods you use? Regularly Sometimes Not use

<b>Antioxidants</b> (e.g. extract from the vine-resveratrol, green tea extract, coenzyme Q10)			
<b>Herbal products</b> (e.g. herbal extracts a teas, extracts from Echinacea, Ginkgo, Aloe Vera)			
<b>Enzymes</b> (papain, bromelain, preparations e.g. Wobenzym, Phlogenzym)			
<b>Phytoestrogens</b> (capsules or tablets used in the menopause)			
<b>Articular nutrition</b> (e.g. gelatine, glucosamine, chondroitin, etc.)			
<b>Minerals</b> (e.g. calcium, magnesium, potassium, iron, salt with addition of iodine, etc.)			
<b>Unsaturated fatty acids and plant sterols</b> (e.g. Omega-3 a Omega-6 polyunsaturated fatty acids, type of products: Flora pro activ, Rama, Bio eggs, sunflower, linseed, olive oil)			
<b>Probiotics</b> (e.g. products Actimel, Activia, kefir milk, acidified milk) a <b>Prebiotics</b> (e.g. Lactulosa)			
<b>Sports nutrition</b> (e.g. ionic drinks, proteins, amino acids, carbohydrates gainers, etc.)			
<b>Vitamins</b> (e.g. folic acid, vitamin A, B, C, D, E, K, carotenoids)			
<b>Fibre</b> (e.g. Graham bread, whole grain breads, oatmeal, muesli, Psyllium)			
<b>Child nutrition</b> (baby food Nutrilon, Beba, Hami food, elevenses)			
<b>Products for particular nutritional uses</b> (for diabetics, for people suffering gluten intolerance/lactose)			
<b>Other</b> (specify):			

2. What is the reason for you to use dietary supplements and functional food? To support:

	Yes	No
Weight loss or control body weight		
Ophthalmic health and support of eyesight		
Body's resistance against fatigue and stress		
Mental activity and performance (concentration, memory, etc.)		
Respiratory system (to facilitate coughing, clearing air passages)		
Physical and sport performance		
Gastrointestinal tract (activity of bowels, digestion, liver, gall bladder, etc.)		
Immune system and defensive capacity		
Cardiovascular system (level of cholesterol, sugar, blood pressure, vascular health)		
Musculoskeletal system (health and regeneration of joints, bones, tendons, muscles)		
Reproductive and sexual health (prostate, fertility, sexual activity)		
Excretory system (kidneys, bladder, urinary tract, etc.)		
Healthy skin, hair and nails		
Premenstrual and menopausal comfort		
Healthy sleep and relaxation		
Other (specify):		

3. Do you know the place of origin or manufacture of products you take? If yes, specify:

- Yes,  
 No

4. Are you willing to use products that have been produced or originated from these regions?

Please select:

<b>Origin</b>	Yes	No
Africa		
Central and South America		
Asia		
Australia, Oceania		
Europe		
North America		

<b>Final produced</b>	Yes	No
Africa		
Central and South America		
Asia		
Australia, Oceania		
Europe		
North America		

5. Are you interested in composition of these products?

- Yes
- No
- Partly

6. Do you prefer more natural or synthetic products?

- Natural
- Synthetic

7. How often do you buy these products?

- Every week
- Every month
- Once in three months
- Once in six months
- Once per year
- Less than once pre year

8. In which form do you prefer dietary supplements?

- Capsules, pastilles
- Tablets
- Pills
- Sachets of powder
- Ampoules with fluid
- Drops
- Other:

9. In which form do you prefer functional foods?

- Dairy products
- Pastry
- Oils, butter, eggs
- Salt
- Powdered milk, mash (baby nutrition)
- Sweets with artificial sweetener
- Other:

10. How do you gather information regarding dietary supplement/functional food?

- Internet
- Salesman in specialized shops
- Distributor
- Promotional materials (leaflets, brochures, etc.)
- In pharmacy
- Friends and colleagues
- Doctor
- Family
- Literature (books, scientific journals)
- Media (TV, radio)

11. What affects your decision in purchase of dietary supplements/functional food?

- Brand
- Price
- Composition
- Country of origin
- Form (drops, capsules, etc.)
- Other, please specify:

12. Where often do you buy dietary supplements/functional food?

- Specialized shops
- Supermarkets
- Distributors
- Pharmacy
- E-shop
- Other, please specify:

13. How much you spend on dietary supplements/functional food on average per month?

- Less than 250 CZK
- 250-499 CZK
- 500-999 CZK
- 1,000-1,999 CZK
- 2,000 CZK and more

Personal questions:

14. Gender:

- Female
- Male

15. Highest education level:

- Primary
- Vocational
- Secondary
- University

16. Age (please select the appropriate age category):

- Under 18 years
- 19-29
- 30-39
- 40-49
- 50-59
- 60 and more

17. Economic activity:

- Student
- Employed
- Entrepreneur
- Unemployed
- Pensioner
- Maternity leave

18. Where do you live? Town/village with a population:

- To 10,000 inhabitants
- 10,001-50,000
- 50,001-100,000
- 100,001-1,000,000
- 1,000,001 and more

19. What is the **net income** of your household **per month**?

- Less than 6,000 CZK
- 6,001-8,000
- 8,001-10,000
- 10,001-15,000
- 15,001-20,000
- 20,001-30,000
- 30,001-50,000
- 50,001 and more CZK

**Appendix No 3-** Statistical analysis- Association between interest in composition of DS and FF and level of education

	Chi-square	df	p-value
<b>Pearson Chi-square</b>	40.30068	df=6	<b>p=0.00000</b>
M-L Chi-square	36.48952	df=6	p=0.00000
Phi	.2304280		
Contingency coefficient	.2245438		
Cramér's V	.1629372		



**Appendix No 4-** Statistical analysis- Association between source of information and residential area

	Chi-square	df	p-value
<b>Pearson Chi-square</b>	39.38503	df=36	<b>p=0.32091</b>
M-L Chi-square	40.43947	df=36	p=0.28062
Phi	.1308300		
Contingency coefficient	.1297245		
Cramér's V	.0654150		

**Appendix No 5-** Statistical analysis- Association between use of each DS and FF and level of education

Antioxidants	Chi-square	df	p-value
<b>Pearson Chi-square</b>	6.871699	df=3	<b>p=0.07610</b>
M-L Chi-square	7.251786	df=3	p=0.06429
Phi	.0953391		
Contingency coefficient	.0949088		
Cramér's V	.0953391		

Herbal products	Chi-square	df	p-value
<b>Pearson Chi-square</b>	5.285515	df=3	<b>p=0.15205</b>
M-L Chi-square	5.244329	df=3	p=0.15476
Phi	.0836147		
Contingency coefficient	.0833239		
Cramér's V	.0836147		

Enzymes	Chi-square	df	p-value
<b>Pearson Chi-square</b>	4.387188	df=3	<b>p=0.22258</b>
M-L Chi-square	5.247238	df=3	p=0.15456
Phi	.0761785		
Contingency coefficient	.0759584		
Cramér's V	.0761785		

Phytoestrogens	Chi-square	df	p-value
<b>Pearson Chi-square</b>	4.729303	df=3	<b>p=0.19273</b>
M-L Chi-square	8.055373	df=3	p=0.04488
Phi	.0997819		
Contingency coefficient	.0992888		
Cramér's V	.0997819		

Articular nutrition	Chi-square	df	p-value
<b>Pearson Chi-square</b>	7.813049	df=3	<b>p=0.05004</b>
M-L Chi-square	7.997814	df=3	p=0.04606
Phi	.1016598		
Contingency coefficient	.1011386		
Cramér's V	.1016598		

Minerals	Chi-square	df	p-value
<b>Pearson Chi-square</b>	1.110004	df=3	<b>p=0.77466</b>
M-L Chi-square	1.058143	df=3	p=0.78719
Phi	.0383179		
Contingency coefficient	.0382898		
Cramér's V	.0383179		

Unsaturated fatty acids and plant sterols	Chi-square	df	p-value
<b>Pearson Chi-square</b>	1.194398	df=3	<b>p=0.75435</b>
M-L Chi-square	1.187397	df=3	p=0.75603
Phi	.0397478		
Contingency coefficient	.0397165		
Cramér's V	.0397478		

Probiotics	Chi-square	df	p-value
<b>Pearson Chi-square</b>	5.354299	df=3	<b>p=0.14762</b>
M-L Chi-square	4.972748	df=3	p=0.17380
Phi	.0841570		
Contingency coefficient	.0838606		
Cramér's V	.0841570		

Sport nutrition	Chi-square	df	p-value
<b>Pearson Chi-square</b>	9.565409	df=3	<b>p=0.02265</b>
M-L Chi-square	10.87953	df=3	p=0.01240
Phi	.1124840		
Contingency coefficient	.1117791		
Cramér's V	.1124840		

Vitamins	Chi-square	df	p-value
<b>Pearson Chi-square</b>	4.384131	df=3	<b>p=0.22286</b>
M-L Chi-square	4.065220	df=3	p=0.25451
Phi	.0766606		
Contingency coefficient	.0764363		
Cramér's V	.0766606		

Fibre	Chi-square	df	p-value
<b>Pearson Chi-square</b>	9.791307	df=3	<b>p=0.02043</b>
M-L Chi-square	8.807123	df=3	p=0.03197
Phi	.1138045		
Contingency coefficient	.1130746		
Cramér's V	.1138045		

Child nutrition	Chi-square	df	p-value
<b>Pearson Chi-square</b>	12.59820	df=3	<b>p=0.00559</b>
M-L Chi-square	13.01785	df=3	p=0.00460
Phi	.1290902		
Contingency coefficient	.1280279		
Cramér's V	.1290902		

Particular nutritional uses	Chi-square	df	p-value
<b>Pearson Chi-square</b>	9.066645	df=3	<b>p=0.02842</b>
M-L Chi-square	9.172618	df=3	p=0.02708
Phi	.1095122		
Contingency coefficient	.1088613		
Cramér's V	.1095122		