

NUTRITION PARTICULARITIES AND CHANGES IN EATING HABITS DURING A PANDEMIC

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Abstract

Representatives of the World Health Organisation (WHO) identify nutrition as a significant factor that determines our health. Recommendations for healthy eating are constantly updated given the latest research outcomes. Food culture in Lithuania is in line with global trends. The primary trend is responsible consumption. The importance of a balanced, healthier diet increases as consumers are more concerned about what they eat. When shopping, they tend to read labels and more often choose higher quality products. The importance of vegetables and plant-origin food in our diet is growing. Everyone has a subjective opinion on eating, and this often leads to significant eating errors. A healthy diet is based on the choice of the right food that meets the physiological needs of the body, the supply of the body with necessary nutrients that determine the renewal of body cells and normal development of the body, following the principles of the healthy diet (Matulionyte, 2018). Results obtained from the recent research show that over the last twenty years, the lifestyle habits of the Lithuanian population are becoming more health-friendly. Yet, widespread unhealthy eating habits still prevail (Cesnaviciene et al., 2015). Unhealthy diets are characterized by higher consumption of processed foods, sugar-sweetened beverages, trans fats, saturated fats, added salt and sugar, and lower amounts of fresh fruits, vegetables, nuts, and healthy grains in the diet (De Ridder et al., 2017). A study conducted in the Netherlands in 2016, which includes 1063 respondents representing the Dutch population, found that 28 percent of consumers inquire for recommendations on healthy eating at friends and relatives, whereas 45 percent search for information online. Due to a large amount of information available media sources, consumers find it more difficult to distinguish scientifically proven facts on nutrition from misleading information on healthy food choices (De Ridder et al., 2017). Research carried out in Lithuania shows that there has been a tendency to develop unhealthy eating habits, characterized by excessive consumption of animal-origin products and an inadequate number of vegetables and fruits. As a result, this leads to a high intake of fats and cholesterol and an insufficient intake of carbohydrates and dietary fibre (Terajeva et al., 2015). Food consumption is closely related to our habits, in addition to food waste. Today, food wastage is a significant problem, so it's no surprise that it's constantly tackled every year. The zero-waste movement aims to stop people from using disposable cups, straws, plastic bags, encourages the use of leftovers, and promotes responsible food consumption. Annually, approximately one-third of the world's edible food is lost and wasted, in addition to the resources used for production and the personal income of the population. Unfortunately, there have been no reliable data regarding food waste in Lithuania. Therefore it is believed that under conditions of the crisis caused by the coronavirus pandemic, in cities, the problem of food waste has become even more relevant than before. It is assumed that people's eating habits have changed. As a result, at the beginning of January 2021, an online study was launched to identify the changes in eating habits and food waste during the pandemic.

Keywords: healthy food, food waste, pandemic.

Received: 07.03.2022

Reviewed: 24.03.2022

Accepted: 25.03.2022

1 INTRODUCTION

We need food every day, so food culture and society are inextricably linked, and health programmes have a major impact on our diets. Recently, organic, gluten-free, preservative-free, vegan and vegetarian products have become more popular in supermarkets as a result of changing eating habits and food culture in Lithuania (Grabauskas, et al., 2012).

Evidence from the WHO shows that 70% of chronic diseases are caused by diet, bad habits and physical inactivity. According to the statistics, Lithuania falls into the highest risk group in the context of European

countries. In terms of food culture, food waste raises public concern.

Food waste has inevitable social, economic, ecological and ethical consequences. According to the European Union data, almost 800 million people suffer from inadequate nutrition, and more than 700 million people live below the poverty line worldwide. Provisional data from the State Food and Veterinary Service and the Food and Agriculture Organisation of the United Nations show that there are 173 kg of food waste per person in the EU and 60 kg per person in Lithuania.

Every year, 89 million tons of foods are wasted across Europe in comparison to more than 500 thousand tons in Lithuania (Lithuanian State Food and Veterinary Service, 2019).

A large selection of food products available in the supermarkets aims to attract as many potential customers as possible, and the product's appearance plays a vital role. An abundance of food products can mislead a customer, especially when choosing safe and healthy products. As Westenhoefer (2005) claims, a wide choice of products provides customers with the right to choose, yet, at the same time, they face a problem with what to choose.

As Fuquay (2011) states, the main goal of the food industry is to produce a food product at the lowest possible price, with a more appealing look and a longer shelf-life. Therefore, to achieve this goal, food additives are added to food products. It is important to note that substances used for nutritional purposes, such as vitamins, minerals, salt substitutes, are not considered food additives.

Despite advanced technologies that consumers may benefit from, people lack knowledge of what, how, and how much food to eat. Interest in a healthy diet is growing, yet there are no significant changes in eating habits as consumers' tendency to eat fast food, high in fat, sugar, and salt, and low-fibre foods prevail.

In 2016, the global fast-food market increased by more than \$ 539.63 billion. Based on the market predictions, in 2022 fast food market is expected to exceed the \$ 690.80 billion limit and is likely to grow just over 4,20 percent from 2017 to 2022 (Zion Market research, 2019).

Trans fats, saturated fatty acids, acrylamide, monosodium glutamate, salt, and sugar are the main substances found in fast food that have a negative impact on human health. These substances can cause chronic diseases if such food is eaten on a regular basis and in large quantities. Frequent consumption of fast food (if it is eaten more than twice a week) increases body weight and the risk of obesity. It is also considered a major risk factor for type 2 diabetes, vascular and heart disease, stroke and hypertension, as well as some oncological diseases (Meskauske, 2015).

Some dairy and meat products, including butter, lamb and beef, are naturally low in trans fats. Several research carried out are insufficient to determine whether these naturally occurring fats harm cholesterol levels in comparison to industrially produced trans fats (American Heart Organisation, 2017). Based on the studies carried out in Europe, men consume 0.5-2.1 percent of trans-fats of daily energy intake, and women 0.8-1.8 percent, respectively. According to other studies, the highest intake of trans fats is attributed to consumers aged 18-30 years, low-income people, university students.

According to the WHO, the recommended annual amount of sugar should not exceed 10 kg. Excessive sugar consumption causes great harm to the body. Frequent consumption of foods high in sugar increases

the risk of tooth decay, serum triglyceride levels leading to a higher risk of atherosclerosis, circulatory diseases, diabetes (Rolfes, Pinna, & Whitney, 2014). A high risk of overweight and obesity is associated with increased sugar intake (Brownell et al., 2009). If the intake of carbohydrates is too high and energy obtained from them exceeds the body's energy needs, then the excess of carbohydrates is converted into fat.

Edible salt is one of the main sources of sodium, but today people use it too much. According to the WHO, up to 5 g of salt should be consumed per day, but most Europeans consume 8-12 g of salt daily (Arcand & et al., 2017). Too much sodium can increase blood pressure and make the kidneys work harder. High blood pressure is a major cause of stroke, heart attack, heart failure, kidney disease, etc.

"In the modern world, a consumer wants delicious and nutritious food; therefore, with the constant increase in its demand, food additives continue to play a very important role in food production" (Gruzdienė, 2005). It should be mentioned that it is important not to misuse food additives, and they should not be used to deceive the customer or to produce food in a higher quantity than necessary to achieve the desired result.

A well-balanced diet, physical activity, avoidance of harmful habits, and other factors affect health status. It has been determined that 40-60 percent of human health depends on lifestyle, 30-40 percent on the environment, and only 8-10 on health services (Januskeviciene, Sekmokiene & Lukosevicius, 2009). Senikiene, Lukosevicius, Jurkstiene et al. (2016) claim that a healthy, well-balanced diet affects an individual's physical and mental development, work performance, and longevity.

Barzda et al. (2016) state that in Lithuania, consumption of vegetables and fruits per capita is insufficient, on average 260 g a day. Only one-third of the population consumes vegetables and fruits daily.

Dietary fibre is essential in the diet. According to water solubility, dietary fibre is classified into water-soluble and water insoluble (Dhingra, Michael, Rajput, and Patil, 2012).

Lignin, cellulose, and some hemicellulose are water-soluble fibre, and pectin, insulin, β -glucans, resins, and other non-starch polysaccharides are water-insoluble.

Soluble dietary fibre dissolved in water forms a gel-like consistency, which slows down the digestive process and gives a feeling of satiety, reduces blood pressure, the amount of "bad" cholesterol in the blood, and glucose uptake in the small intestine. Water-insoluble dietary fibre does not change and performs other functions: it controls pH, accelerates the excretion of toxic substances through the colon, thus reduces the risk of colon cancer, enhances contraction of the intestinal wall, and is a preventive measure against constipation (Perry & Ying, 2016).

Cereals are one of the main sources of dietary fibre, and in Western countries, cereals account for approximately 50 percent of dietary fibre. Vegetables contain 30-40 percent of dietary fibre, fruit 16 percent,

and the remaining 3 percent of dietary fibre is obtained from other food products (Dhingra, 2012).

Farvid et al. (2016) state that a high intake of dietary fibre reduces the risk of breast cancer. Women who consume foods rich in fibre during adolescence are at a lower risk of cancer in comparison to those who consume less dietary fibre at a young age.

Based on the research data, dietary fibre food supplements improve the metabolic processes and health conditions for obese and overweight individuals (Thompson, Hannon, An & Holscher, 2017). However, it should be borne in mind that a food supplement does not provide as many minerals as a natural food containing dietary fibre.

An important factor in maintaining good health is proper nutrition. Weight control has a positive effect on health. One of the most important factors that affect lifestyle is a healthy and well-balanced diet. Promoting a healthy diet is a priority of the WHO food, physical activity, and health strategy (Lithuanian State Food and Veterinary Service, 2019).

While eating food, an individual receives energy and nutrients, and by actively spending time, he wastes the energy received. Failure to maintain this balance and consumption of too many calories poses the risk of obesity, cardiovascular and other chronic diseases (Stukas, 2019).

Obesity is dangerous for health-related to the concomitant psychosomatic diseases and disorders of various body functions. Obesity is a risk factor that causes health disorders and conditions such as high blood pressure, high cholesterol, diabetes, cardiovascular diseases, asthma, arthritis, and certain forms of cancer. Furthermore, moving from the overweight group to the obesity group shortens life expectancy. The rising prevalence of obesity is associated with an increased risk of chronic diseases.

Today, consumption of partially hydrogenated and fully hydrogenated fats, ignorance of the diversity of foods and a balanced diet, prevailing overconsumption, and food waste have become a relevant issues.

Rapid technological developments to improve food safety have enabled accurate assessment of quality beyond subjective means such as appearance, aroma, and taste. These changes have been prompted by a range of factors:

- ongoing concerns about the need to protect consumers from hazards to food safety;
- changing food supply patterns serving an increasingly affluent and sophisticated demand;
- scientific evidence of the linkages between diet and health;
- and the continuously evolving regulatory framework.

From the passing of effective laws against food adulteration during the mid-19th century to the present day, food legislation has focussed on setting the minimum food safety standards acceptable to society (Toma et al., 2020).

Food waste has been found to be mainly driven by unplanned daily food consumption patterns, such as: the quality of the food stored depends on the type of product, the storage conditions, and the use of innovative technologies that have an impact on reducing consumer food waste (Dobernig, 2019).

Globally, almost one third of the food produced is lost or thrown away. In Europe, enough is thrown away to feed 200 million people every year (Vitunskienė, 2020).

According to the FAO, food waste occurs at the retail and consumer level, and food loss is a reduction in quantity or quality that occurs along the entire food supply chain from harvest to retail (FAO, 2019).

Food thrown away by retailers or consumers is food waste that does not have to be reported to anyone, making it difficult to collect data on food waste.

According to FAO estimates, around 1.3 billion tonnes of food is lost from farm to fork each year worldwide, including vegetables, fruits, cereals and cereal products, fish and other seafood, meat and dairy products (Vitunskiene, 2020).

As Dobernig & Schanes (2019) argues, it is very important to understand shelf-life as it is often cited as an important cause of food waste.

Such Products labelled 'Use by' are usually stored in refrigerators and have a shelf life of no more than 30 days, after which the products are unfit for consumption.

'Best before' products have a shelf life of more than 30 days. In addition to the expiry date, the storage conditions of the product must be indicated. At the end of the shelf life, such products cannot be sold, but the product will not be spoiled yet. The product can be consumed, but attention must be paid to whether its appearance, colour and smell are unchanged (Lithuanian State Food and Veterinary Service, 2019).

Professor Vitunskiene (2020) gives recommendations on how to reduce food waste in everyday life.

At home:

- to plan portions and meals – not to cook more than necessary;
- to use up leftovers, for example, make cocktails or desserts from misshaped fruits, make soups or stews from wilted vegetables;
- to use plates smaller in size - this will help not to put more food than you can eat;
- to note the difference between the terms 'use by' (food safety warning) and 'Best before' (manufacturer's recommendation, which allows the consumer to decide for himself whether to eat product after this date);
- to dry and freeze - almost every foodstuff can be frozen;
- to share food - to donate its surplus to friends, colleagues, or neighbours.

In the shop or market:

- to check available food products before making a shopping list;
- don't shop when hungry;

- to buy as much as needed – to choose the right package size or quantity.
At work, school, and university
- in the canteen not to order more food than you can eat.
- to educate consumers about responsive food consumption – share advice with others on ways how to reduce food wastage.
In café, restaurant, hotel
- to choose a smaller plate, especially at the buffet;
- to take leftover food.

During the first quarantine of Covid-19, there was a sharp increase in food purchase and consumption, food hoarding and food waste. Consumers' shopping and food consumption patterns changed slightly during the subsequent quarantine periods.

Consumers look for advertising and promotions when buying food and may be disappointed when they taste it, as there is more than one producer offering the same food under the same name. Popular semi-finished products, food that does not require a lot of time and effort, often do not meet expectations.

Preventive action and changes in dietary habits are essential to reduce food waste.

Research problem: Food waste is caused by inappropriate shopping and eating during the Covid-19 pandemic.

Aim of the study: to identify the eating habits changes that occurred during the Covid-19 pandemic.

2. Methodology of the study

The self-administrated, multicomponent survey form was prepared by using electronic survey system (www.apklausa.lt) in Lithuanian language.

This online survey was conducted in Lithuania between 5 January 2021 and 30 January 2021 using a quantitative research methodology.

The questionnaire was designed to assess changes in food waste and diet over the Covid-19 period.

The questionnaire included questions about the changes of eating habits, food purchase, consumption and waste due to Covid-19 pandemic crisis. The survey included multiple-choice questions.

3. Results and discussion

A lot of food is thrown away because of misjudgements about how much will be consumed, which raises the question of whether we are doing the right thing.

A total of 103 Lithuanian consumers participated in the survey. Among them 74.5% were women and the rest were men.

The age distribution was 9% for people aged 35-42; 12% for people aged 43-50; 18% for people aged 26-34; 18% for people aged 51 and older. The majority of surveyed people were young adults aged 18-25.

Responses to the question on the changes of eating habits due to Covid-19 pandemic crisis are shown in Table 1.

Table 1. Changes of food consumption habits due to Covid-19 pandemic

Response options	Proportion, %
Threw away more food	8.7
Started eating healthier	13.3
Started buying more food	21.3
Changes in eating habits	28
No change in eating habits	28.7

The results show a 28-28.7% split between changed and unchanged eating habits.

According to the results of eating habits changes of Italian population (Di Renzo et al., 2020), more than half of the survey participants felt a change in their hunger perception.

Among respondents 13.3% of them started eating healthier food. The food consumption behaviour analysis in USA (Chenarides et al., 2020) performed over the Covid-19 period show that food consumption among 60% of respondents almost did not change and only 6 % of respondents started eating healthier food.

In our study 21.3% of consumers started to buy more food, it is likely that such behavior was influenced by an immediate instinctive reaction to hoard food due to Covid-19 pandemic restrictions and recommendations to go out less without necessary reasons. The 8.7% started to throw more food away. Study made in Italy by Amicarelli & Bux, (2021) showed, that the highest amount of food waste is due to unavoidable waste, occurring most often during food preparations and due to limited cooking skills.

Throwing away food is associated with more food purchases, lack of food control and throwing away leftovers while healthier eating may be associated with cooking at home.

The responses to the question on changes in food consumption are shown in Table 2.

Table 2. Changes in food consumed

Response options	Proportion, %
Sugary drinks and fast food	25-29
Sweet products, fish products, wheat/wheat flour-based foods (pasta, bakery products, etc.)	43-49
Seeds, nuts, legumes (beans, peas, chickpeas, lentils, soybeans, etc.), wholemeal products (pasta, bread, etc.)	50-53
Meat products and potatoes, carrots, spinach, lettuce, broccoli, celery, kale, red cabbage, cauliflower, etc.	57-58
Groats, fruits, berries and tomatoes, cucumbers, aubergines, sweet peppers, zucchini, pumpkins, artichokes, etc.	60-68

During Covid-19 pandemic consumers declared to eat more healthy food - vegetables, fruits, berries, groats.

According to the results of survey consumption of these products increased by 60-68 %.

The pilot survey of Italian consumers (Fanelli, 2021) shows, that around 90% of the respondents increased their consumption of fruit and pasta; and 85.4% increased consumption of vegetables.

According to survey results of Turkish consumers obtained by Bolek (2021), 64% of respondents tried to consume more fresh fruit and vegetable since the beginning of Covid-19 pandemic.

The results also show that during a pandemic, the increase of consumption of sugary drinks and fast foods was between 25-29%.

The research performed by Di Renzo et al. (2021) about eating habits in Italy during Covid-19 pandemic crisis shows that 29.8% of people decreased the junk food consumption while 25.6% of people increased it.

During the pandemic, consumers ate a variety of foods at home, but did not give up sugary drinks and fast food.

Responses to the question on the causes of food waste are shown in Table 3.

Table 3. The causes of food waste

Response options	Proportion, %
Getting tired of eating the same food	9.2
Buying too big packages	15
Leftover food	16.8
Buying too many products	17.3
Fear of poisoning	17.9
Not appreciating what is in the fridge or freezer	23.7

Even if nowadays attention given to food waste is one of important aspects of food usage, our survey results show that due to various reasons a lot of food is thrown to the wastes. The main causes of food waste according to survey results were: "Not appreciating what is in the fridge or freezer", fear of poisoning, buying too much food and leftover food.

These results suggest that consumers lack the ability to assess the shelf life of products.

According to the research results of Italian population about eating habits during Covid-19 pandemic (Di Renzo et al., 2020), 54% of people claim to consume the leftover food more than 30% of time.

Results of survey about assessment of household food waste in Serbia (Berjan et al., 2021) illustrate, that approximately one out of three respondents bought more food than usually (24.5% more and 5.5% much more). This change in food buying habits might indicate panic buying and food accumulation behaviours among consumers due to Covid-19 pandemic.

In the research of Di Renzo et al. (2021) was investigated food safety aspect. Around 70% respondents agreed that food safety is crucial aspect of food products and only 30% claimed that food safety was not so essential.

Responses to the question on the most frequently discarded food products are shown in Table 4.

Table 4. Food is the most commonly discarded

Response options	Proportion, %
Carrots, potatoes	3.8-4.9
Sour cream	5.4
Apples, bananas, tomatoes	6.6
Sweet confectionery	7.7
Salads, cottage cheese	12.1-12.6
Bread products	22.5

The results of the survey show that the most commonly discarded foods are bakery products, dairy products, fruits and vegetables.

The survey results are similar to the results obtained in Switzerland by Visschers et al. (2016), in Italy by Amicarelli & Bux (2021) and Serbia by Berjan et al. (2021).

Fruits and vegetables are easily spoiled products due to microbiological characteristic and high content of water, especially if they are not properly preserved.

For instance Amicarelli & Bux (2021) estimated that most of the food waste consists of vegetables (19%), milk and dairy products (17%) and bakery and bread products (13%).

Thus, it can be assumed that consumers lack knowledge of preventive food preservation measures.

Respondents were asked how they felt after throwing away food. 4.9% had no answer to this question, 12.6% did not feel bad, but 82.5% of the respondents did not feel happy about throwing food away. Similar results were obtained in a study conducted by Berjan et al. (2021): 89% of participants were concerned about food waste. It can be said that the majority of consumers value food.

Table 5. Food purchases.

Response options	Proportion, %
Buy discounted products	28
Make a shopping list	32.5
Check what food supplies they have	38

Lockdown due to Covid-19 pandemic had also unexpected results: people had more time for food stockpile and planning, to learn and/or improve food cooking skills, some of them paid more attention to the choice of food and diet. The survey results show that more than 30% of the respondents were making a shopping list.

Making a list of groceries before shopping is beneficial; it not only reduces costs but also helps to reduce the amount of purchases, generation of leftovers and food waste (Amicarelli & Bux, 2021).

Nearly 40% of respondents check what food supplies they have at home before going shopping. This is one of the positive habits which help to reduce over purchase and food waste.

Conclusions

In summary, the consumer's health outcomes and well-being are largely determined by lifestyle choices, as health is determined by internal and external social factors.

Food wasted throughout the food production, marketing, and consumption chain, which is an economically and morally negative phenomenon.

Consumers are thought to misunderstand 'Use by' and 'Best before' food labels and are unaware of preventive measures to avoid food waste, which may contribute to increased food waste. It is imperative to develop skills that help reduce food waste in daily life.

Summarising the results obtained from the survey conducted, the following conclusions can be drawn about the changes in food waste and diet during the Covid-19 period, that food waste is most common among young people aged 34 and younger. During the quarantine, most people ate a normal diet, often home-cooked, with healthier foods such as nuts, seeds, wholemeal products, fish and pulses, but a small number of respondents ordered fast food and sugary drinks to take home. They did not assess what they had in the fridge before shopping, bought too much food and then feared poisoning.

It is therefore recommended to freeze excess food and compost it if necessary.

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