



## FOOD SAFETY FROM CONSUMER PERSPECTIVE: HEALTH SAFETY

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### ABSTRACT

Food industry along with agriculture constitute a major economy sector in most countries, because in addition to water intake and oxygen availability, food is another basic determinant for functioning of the human organism. For the proper functioning of human body, it is imperative that the customer chooses food so that the daily diet includes all the necessary nutrients in a reasonable proportion. At present, however, it is becoming more and more common that foodstuffs do not meet strict standards, are not properly stored, the packaging is damaged, or hygiene standards are not being adhered to, and therefore, in addition to health benefiting substances, they also contain harmful ones. According to the World Health Organization, the death of up to 2 million people a year around the world is caused by foods harmful to human health. The main objective of this report was to assess how consumers perceive the health safety of food in Slovakia and to find out whether some types of food are considered as potentially harmful to health. Primary data were obtained through a questionnaire survey conducted from October to December 2017 on a sample of 478 respondents. Respondents answered to 12 factual, and 9 classification questions, which were consequently analyzed using the Friedman test, Nemenyi test and Chi-Square test of Independence. Survey results showed that the majority of respondents had concerns about the health harming effects of food only occasionally and they trust the hygienic level of the restaurant facilities (60.5%), fast food (53%) and frozen food (49.2%) with few reservations. As the most hazardous foods are considered poultry meat, eggs and mayonnaise. If the consumer's health is endangered by food, the guilty party should be punished by ban (61.9%) or by suspension (19.5%).

**Keywords:** food safety; health safety; food; foodstuffs; consumer; health

### INTRODUCTION

Growing concerns with the application of highly toxic pesticides and the growing world demands for food direct our attentions to the food safety as well as to the global arrangement of food production (Dou et al., 2015). Population as a whole, individuals and households as self clear-cut social groups, which buy products for their personal consumption create the consumer market. Each person decides on purchase of the product range everyday. (Kubicová and Kádeková, 2011). Even global consumers are nowadays more concerned about the safety of food products because of a series of food scandals that have been occurred over the last decade and because of the fact that they have not seen signs of decreasing the frequency of occurrence of food scandals (Loc, 2006). Even though food products seem to be safer than ever before, from a technical point of view and due to many quality control programs, the safety perception of consumers has decreased significantly (Trienekens and Zuurbier, 2007). Food production has global character; therefore the consequences of

contamination can potentially be very broad and can harm human health and erode the credibility of manufacturers, regulatory bodies and also the good name of produced foodstuffs (Golian et al., 2006). It is important to direct the attitudes of man and whole society towards the rational consumption and nutrition of the individual types of food, in order to make food production and consumption more efficient and reduce the threat to the health of the population by civilization diseases caused by improper nutrition (Holien inová, 2013).

Food safety includes food production hygiene, control mechanisms, food chain monitoring, and animal feed safety. In order to ensure food safety, state and state-funded institutions contribute to the creation of legislation, continuous and rigorous health safety and quality control, long-term monitoring of the occurrence of foreign matter, application of scientific knowledge to practice, informing and educating consumers in the field of food handling (Ministry of Agriculture of the Czech Republic, 2018). That the foodstuff is harmless to health can only be said if

there is no nutritional, microbiological, chemical or toxicological hazard from that particular foodstuff (Trusková, 2008). Food safety (Úradníková et al., 2007) can be threatened by biological, chemical and physical risk factors. Biological risks include bacteria, viruses and parasites that are transmissible to humans after ingestion of food and cause disease, and also the bacteria and molds capable of producing toxins in the intestinal tract. Chemical risks cover the range of substances naturally occurring in food, foreign substances and endogenous substances that cause any acute or chronic intoxication or individual adverse reaction in humans. Physical hazards, such as sharp and hard objects of glass, ceramics, stone, metal, wood, plastic, bones, fruit stones, in the food can injure the consumer - breaking the tooth, wounding the tongue, or falling into the larynx. Pieces of plastic, peeled old paint, a piece of masonry, paper, fabric, leather in the food can disgust the consumer. Dust that adheres to the wet food, static-charged paper or plastic, settled on a kitchenware, kitchen utensils or food, can deteriorate sensory properties of food. Any foreign particulate matter or contamination of the food means the aesthetic fault of the product and at the same time may be the cause of its inappropriateness for human consumption (Kerekréty, 2000).

In most developed countries, food safety regulation has focused on the imposition of standards that specify how food products should be produced and/or their final safety level (Rouvière and Caswell, 2012). Food safety and consumer protection are important tasks of several international organizations, such as the Codex Alimentarius and the World Organisation for Animal Health (former International Office of Epizootics) (OIE) operating under the rules of the World Trade Organization (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), the World Health Organization (WHO), and the Food and Agriculture Organization of the United Nations (FAO) (Šinková, 2007). In Europe is the recent evolution of European food safety regulations characterized by the increased involvement and responsibility of private actors in food safety controls (Fares and Rouvière, 2010). European Union policy (European Commission, 2014) is driven by three general objectives - to ensure that food and animal feed are safe and nutritious, to ensure a high level of animal health, welfare and plant protection, to ensure adequate and transparent information about the origin, content/labelling and use of food. Ministry of Agriculture of the Slovak Republic considers food safety a top priority and the system of food safety according to Bírošová and Kaenová (2010) is formed by three essential inseparable areas, including scientific risk assessment, legislation and official authorities control. Consumer safety is paramount when it comes to food safety regulation; however, regulators need to conduct due assessments of food safety risks on consumer, and the cost implications of enforcement strategies on industry, to mitigate costs incurred by industry, without compromising consumer safety (Mensah and Julien, 2011).

Furthermore, the food system involves many factors, from e.g. seed producers, farmers, food industry to retailers, restaurants and consumers, who all have a role to play in the production and consumption of healthy and safe diets. Therefore, any consideration of future developments and challenges need to be inclusive in terms of different relevant

expertise and perspectives (Bock and Bontoux, 2017). The source of food safety in food chain is that the primary products suit the food safety requirements. It is a very difficult or sometimes it is not possible to correct food safety risk factors – which got into the products during cultivation – during processing (KecskesNagy, Korzenszky and Sembery, 2016). The quality and safety of final products depend on the constant manufacturing processes, which are followed, according to the good manufacturing practices (GMPs) and good hygiene practices (GHPs), which constitute the prerequisites of hazard analysis and critical control points (HACCP) plans in the food industry (Wallace and Williams, 2001). However, final products may be further exposed to less controlled conditions along the distribution chain and in the domestic environment. In improper handling after product release and during distribution at the retail level or in households may result in significant deterioration of quality and compromise the safety of the products. Consumers tend to systematically overestimate some potential hazards related to commercially produced food, whereas optimistic biases are much greater for foodborne illnesses occurred from food prepared at home (Verbeke, Frewer, Scholderer, & de Brabander, 2007). Food safety is also important in restaurants. Employees keeping their fingernails clean, employees wearing clean uniforms or protective clothing, and employees wearing gloves while handling ready-to-eat food are the key food safety aspects for casual dining restaurants (Liu and Lee, 2018).

Recurrence of the issues associated with the spread of health-harming food and animal feed, food contamination incidents, the emergence of new contagious diseases in livestock and, last but not least, the contamination of ecosystems by extraneous substances leading the food chain contamination due to environmental pollution, have a significant effect on consumer behavior in the food market and have a negative effect on the credibility of food. A new consumer attitude is born. The consumer becomes an "active teammate", independent and well informed (Skoepa, 2003). Food consumption per capita is everyone's concern and reflects also the socio - economic conditions of people's lives (Kubicová and Kádeková, 2012). Slovak consumers are increasingly perceiving and expressing interest in information on the quality of food products. Quality mark SK is one of the labels that will provide consumer with quick information that the product so labeled is of high quality, safe, and associated with either production or tradition with Slovakia (Supeková, 2008).

### Scientific hypotheses

In relation to questionnaire questions, we have formulated the following hypotheses:

Hypothesis 1: Respondents perceive the potential health harming effects of food differently.

Hypothesis 2: The origin of food is mainly of a concern to the respondents with higher education.

Hypothesis 3: Men and women eat at their workplaces with the same frequency.

Hypothesis 4: City dwellers visit restaurant facilities more often, as there is a larger share of restaurant facilities in urban areas than in villages.

**MATERIALS AND METHODS**

The main objective of this study was to assess how consumers perceive the safety of food in Slovakia and find out if they consider some types of food as potentially dangerous to their health.

Domestic and foreign literature as well as Internet sources served as a source of secondary information for processing the theoretical background on the subject. The source of primary information was a questionnaire survey, on the basis of which our theoretical observations were compared to the information obtained from consumers.

To achieve the above-mentioned goal, anonymous survey was conducted on a sample of 478 respondents from October to December 2017. Questions were divided into two groups. Respondents first answered to 12 factual questions related to food safety issues and then to 9 classification questions. Potential respondents received a questionnaire in paper form. Subsequently, all completed questionnaires were transformed into the Google Forms Internet application. The survey objects were Slovak inhabitants of all ages.

Primary information was processed using the following statistical methods: Friedman test which is a non-parametric alternative to the repeated measures ANOVA where the assumption of normality is not acceptable. Usually it is used in case of ordinal dependent variable. This occurs especially in case of questioner survey, when each respondent assesses more than two products using the same scale. In case of Friedman test applications should be met following conditions: One group that is measured on three or more different occasions.

- Group is a random sample from the population.
- Dependent variable should be measured at the ordinal or continuous level.
- Samples do not need to be normally distributed.

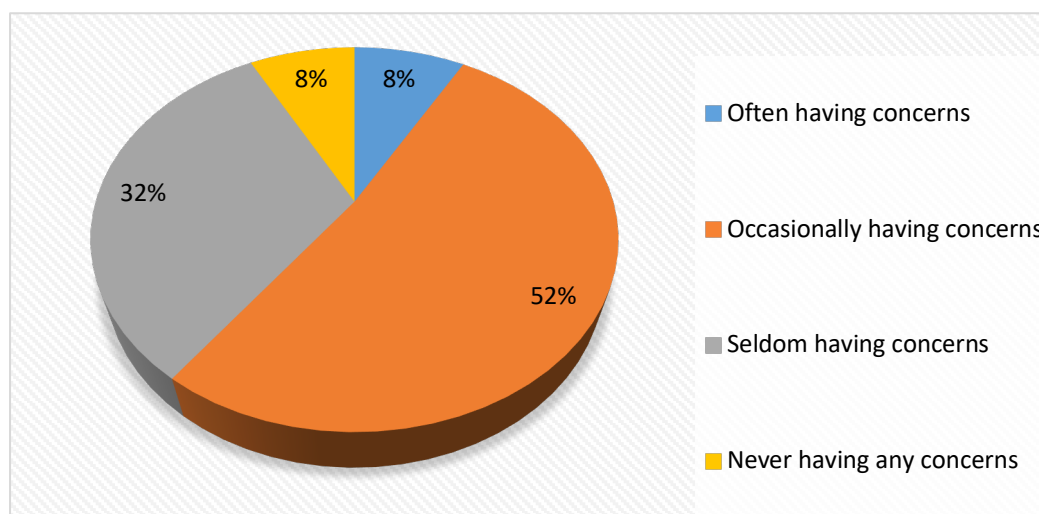
The non-parametric post-hoc test called Nemenyi test which is based on the Kruskal-Wallis method of ranking in a one-way classification and Chi-Square test of Independence to investigate relationship between categorical variables.

The survey included 58.3% of women and 41.7% of men of different age groups. The largest share had the age group

21-30 years old with 46.5% and the smallest was the age group of 60 and above (6.5%). Group with completed higher education represented 46.8%, secondary education 41.8%, apprenticeship 8.1% and basic education only 3.3%. The questionnaire form also included questions about the economic activity of the respondent. The sample contained 170 economically inactive persons (students, retired and unemployed). Other 308 respondents were economically active (employees, employers, self-employed). When respondents selected one of the employment options, they were also asked to specify their profession. Based on the monthly income, respondents were divided into 5 income categories: up to 330 € (8.1%), 331-500 € (8.6%), 501-660 € (21%), 661-830 € (22.1%), and € 831 and over (40.2%). One of the classification questions categorized respondents according the number of family members. Most numerous were groups with four (27.1%) and three (25.4) members. In terms of their permanent residence, respondents came from all 8 regions of the Slovak Republic, namely 47.2% from the rural areas and 52.8% from the urban areas.

**RESULTS AND DISCUSSION**

The first factual question asked in the questionnaire was whether the respondent had any concerns when purchasing food that it might be harmful to the health (**Figure 1**). Only 7.8% didn't feel concerned. Majority of respondents (51.9%) worried about the health harming effects of food only occasionally and 32.1% were seldom concerned. Less than 10% of surveyed respondents feared such effects often. Thus, we can ascertain that consumers do not trust the strict legislation of the Slovak Republic and European Union, upon which the sale of the unsafe food shouldn't occur. This mistrust might also result from the fact that according to the research by **Ergönül (2013)**, up to 34 % of the consumers expressed that they had suffered from food-borne originated stomach ache, whereas the ratio was 30 % for the consumers who had suffered from food-borne diarrhea in the past. On the other hand, ratios of the consumers which suffered from nausea, pyrexia and vomiting were 37 %, 25 % and 30 %, respectively.



**Figure 1** Frequency of being concerned about health harming effects of food.

The second question of the questionnaire (Figure 2) was devoted to individual types of food and should provide information on how frequently they aroused concerns about their possible health harming effects. Respondents rated 9 foods (on a scale from 1 – 4, where 1 is “often” and 4 is “never”): beef, pork, poultry meat, fish, eggs, mayonnaise, fruits, vegetables, and “others”. The most unsafe foods according to Nemenyi test results were poultry meat, mayonnaise and eggs. This result can be attributed to the fact that these products are subject to rapid deterioration, especially when the appropriate thermal conditions are not met during their storage or transport. Eggs, especially those imported from abroad, are also associated with frequent food scandals when they have been contaminated by harmful chemical substances. Similarly, in the **Australian Institute of Food Safety (2016)** feature, poultry meat, eggs, and products made from them had leading positions in the top 10 chart of products causing food poisoning. Moreover, **The U.S. Department of Health and Human Services (2017)** estimates that 79,000 cases of foodborne illness and 30 deaths each year are caused by eating eggs contaminated with Salmonella, because they were not stored properly. As the safest was considered category “others”, also fruits and vegetables, maybe just for the reason that with such foods the first glance can reveal the changes in their sensory properties.

In relation to this issue, Friedman test was used to determine whether there are statistically significant differences in the risk factors evaluation.

*H<sub>0</sub>: All respondents perceived potential health harming effects of food equally.*

*H<sub>1</sub>: Difference existed in the perception of potential health harming effects of the individual types of food among respondents.*

$$p = 0,0001 < \alpha = 0.05$$

To test the hypotheses, calculated p-value was compared to the estimation risk alpha. The null hypothesis was rejected and therefore the alternative hypothesis H1 was accepted. So, with 95% probability, it is possible to claim that there are significant differences among respondents in perceiving the possible health harming effects of the individual food types.

In the next question, respondents were asked to identify 5 of the 13 factors that, in their opinion, pose an actual risk to the health (Figure 3). The intestinal and diarrheal diseases, which form a large group of infectious diseases with a characteristic localization of the infection process in the intestines, were considered by 264 respondents to be the foremost. Contamination may result from insufficiently heat-treated meat or eggs. Also, vegetables and fruits that have been grown in soil fertilized by human feces, hosed with contaminated surface water or contaminated by flies. Molds that can cause liver, kidney, or other chronic diseases after consumption have been identified as hazardous by 233 respondents. The same number also marked the products after expiry date. More and more consumers become aware of the fact that consuming food after its expiration is not worth the risk. However, it is worth mentioning that, according to **Retail magazine (2016)**, almost 40% of the European Union population does not know that eating expired food might be harmful to health and such food should be disposed of. Heavy metals were tagged by 230 respondents. It should be noted that some elements, otherwise considered to be toxic, are essential for human health, but only in small quantities. The problem arises when metals are bioaccumulated in the organism because they are difficult to metabolize. The fifth most relevant factor (224 respondents) was hygiene during the food processing.

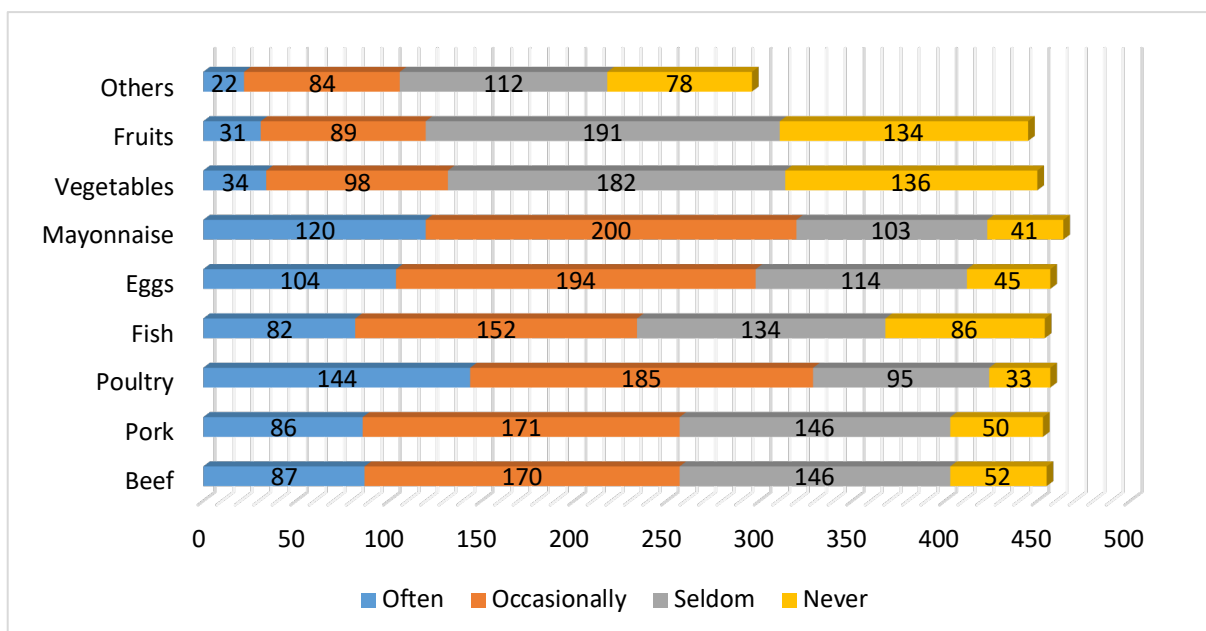


Figure 2 Frequency of being concerned about health harming effects of the individual types of food.

Always or almost always interested in origins of food was 30% of the survey sample (Figure 4). Mostly reading information about country of production or distribution on packaging is 56.4% of the respondents. By contrast, only 13.5% of respondents had no interest in checking where the food products come from. They were mostly people with lower education, in bad financial situation or people from villages and small towns where they have access to local resources. Similar results have also been shown by a MasterCard study, according to which three of four Slovaks (77%) emphasize the origin of food (SITA, 2016).

The answers for this question were tested by the Chi-Square test of Independence to verify whether there is a difference between expressed concern about the food origins based on the education. For this statistical test, following hypotheses were formulated:

*H<sub>0</sub>: No dependence existed between the educational attainment and degree of concern expressed about the origins of the food.*

*H<sub>1</sub>: Dependence existed between the educational attainment and degree of concern expressed about the origins of the food.*

$$p = 0,005 < \alpha = 0.05$$

According to the p-value which was less than the alpha value, alternative hypothesis H1 was accepted. So, with 5% level of significance, there is dependence between

educational attainment and the fact that the person is concerned about the origin of the food. This result has confirmed the hypothesis number 2.

In their evaluation of the 5 most important factors affecting consumer decision making (Figure 5) when purchasing food, more than 80% of respondents considered the price to be the most influential. Similarly, Púchlo (2011) wrote that the Slovak consumer is really price-sensitive and still holding true is that the price plays a major role in buying decision-making. The second most influential factor (78.6%) became the flavor and aroma of the product. Customers mostly buy foods that they already know well and do not risk unnecessarily that the product would not satisfy them. The scent spreading in the store often leads to impulsive purchases, especially in case of fresh pastries or fruit and vegetables. Also, Berík (2017) claims that fragrance as a means of influencing the purchase of a product or service has a long history. The composition and nutritional value of the product (74.8%) is influencing mainly the 21 – 30 years old respondents who care about healthy lifestyle and recommended daily dietary allowances. Top 5 most influential factors included also the manufacturer's brand (which is the image carrier, the guarantee of quality and health safety) and the aesthetic appearance of the product (especially in case of unpackaged foods). On the other hand, factors such as the absence of genetically modified substances, the graphic design of the packaging or the recyclability of the packaging, influenced the decision-making process the least.

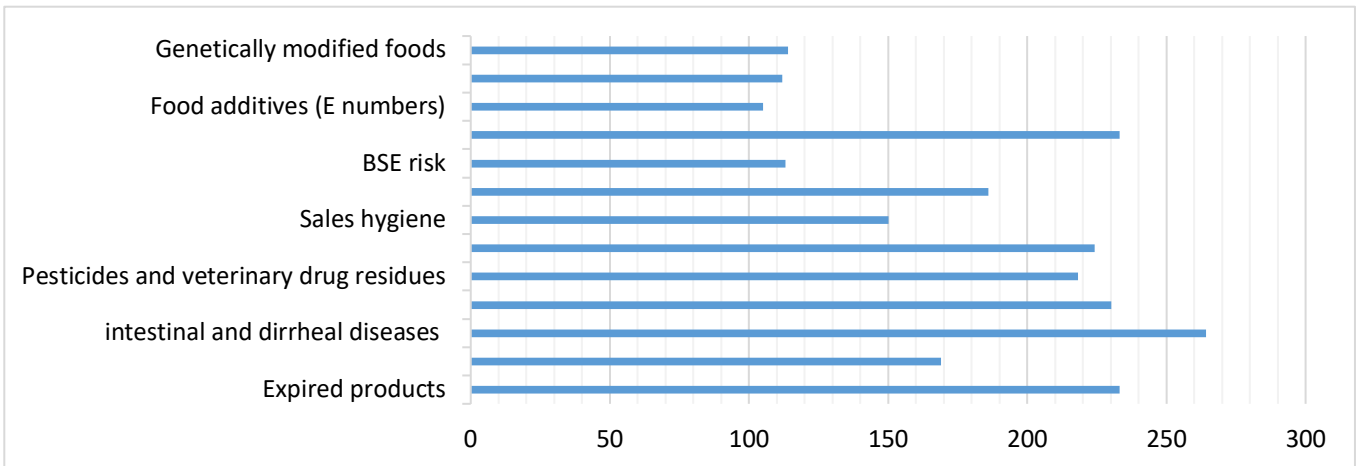


Figure 3 Factors which are representing an actual risk to the health of the respondent.

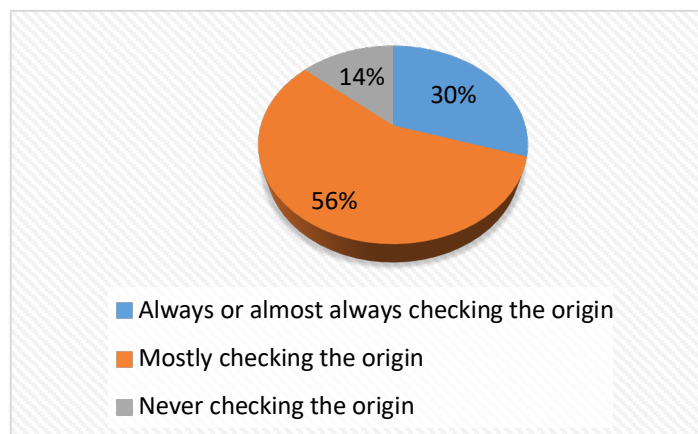
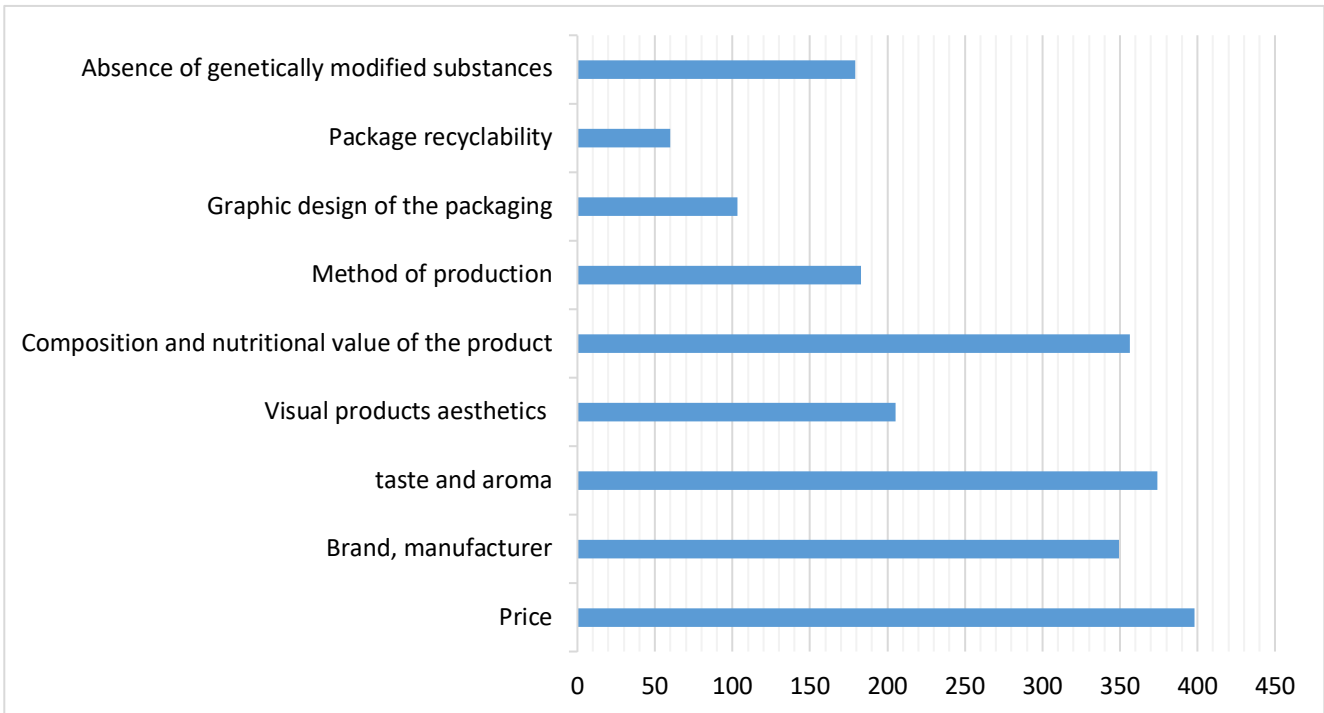


Figure 4 Frequency of checking the information about the country of origin of the food.

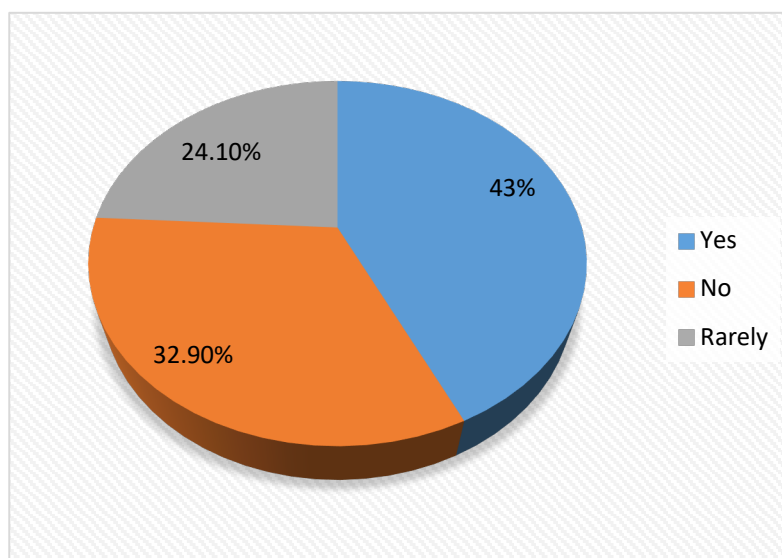
Fifth question of the survey asked respondents to estimate the amount of money spent monthly by their household on food in different types of stores. When estimating the amount spent in discount stores, the largest number of respondents (92) said they did not visit such stores. This can be explained by the fact that many consumers think that these stores offer lower quality food from foreign import. The hypermarkets and supermarkets received the largest variety of purchase value. Three price tiers (30 – 100 €, 101 – 200 € and over 201 €) were selected roughly by 100 respondents. In small self-service shops, consumers usually only spent up to 30 euros, as larger weekly purchases are

made in bigger stores, which usually offer significant discounts on selected food items.

Next question was devoted to the matter of eating at the workplace (**Figure 6**). Regularly eating at the workplace is 43% of respondents and 24.1% does so rarely. These respondents prefer that they do not have to cook at home and can also save money as employers often provide their employees with cheaper meals. Less than a quarter of the respondents is against the eating at the workplace. Reasons to decide not to eat at the workplace could be: improper seasoning, small portions, special dietary requirements, or insufficient hygiene when preparing or serving meals.



**Figure 5** The most important factors influencing consumer purchase decisions when buying food. Source: own research



**Figure 6** Frequency of eating at the workplace.

The Chi-Square test of Independence was used to discover whether there is a dependence between gender of the respondent and eating at the workplace. Hypotheses were formulated as follows:

$H_0$ : No dependence existed between the gender and eating at the workplace.

$H_1$ : Dependence existed between the gender and eating at the workplace.

$$p = 0,320 > \alpha = 0.05$$

P-value had a higher value than alpha, a null hypothesis was accepted. With 95% probability, there is no dependence between the gender of respondent and whether they are eating at the workplace. Our third hypothesis was confirmed.

The majority of survey sample (60.5%) was trusting the restaurant facilities only with few reservations (**Figure 7**). Trusting with no reservations was 19.3% and not trusting at all was 20.2%. The frequent inspections and strict hygiene conditions that must be met by food service providers are not sufficient enough for the consumer to guarantee health safety at food serving facilities. In addition, **Park's (2014)** research found that 44% of foodborne illness outbreaks were tied to restaurants, compared to 24 % that occurred at home.

Most respondents (41.4%) eat only 1-2 times a month in restaurant facilities. The low frequency could be caused by the results of the previous question, which has shown that consumers do not have confidence in restaurants. Another 16.7% did not eat in gastronomical facilities at all. This alternative was selected mostly by retirees with a limited budget, for whom it is considered a luxury they cannot afford. Categories 1-2 times a week, 3-5 times a month and more than 5 times a month were selected by roughly 15% of respondents. Restaurants are especially preferred by the younger generation, as they do not have time to cook at home because of their fast lifestyle, therefore they prefer it as more convenient alternative.

In connection to this question, Chi-Square test of Independence was used to test the below-mentioned pair of statistical hypotheses.

$H_0$ : No dependence existed between the residence of respondent and the frequency of visiting the restaurant facilities.

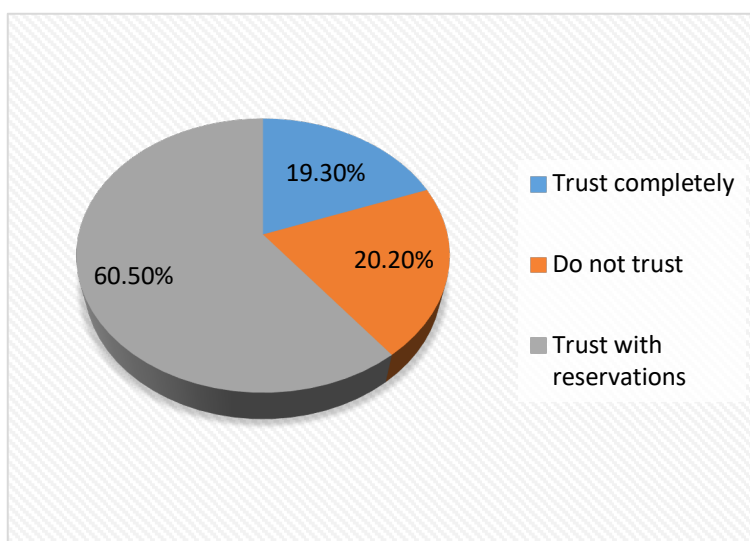
$H_1$ : Dependence existed between the residence of respondent and the frequency of visiting the restaurant facilities.

$$p = 0,016 > \alpha = 0.05$$

After comparing the p-value and the alpha value, we found out that there was a statistically significant dependence between the respondent's residence and the frequency of visiting the restaurant facilities. The hypothesis that residents living in cities visit restaurant facilities more often because a majority of restaurant facilities is situated in cities was confirmed.

Respondents also evaluated fast food facilities (**Figure 8**). The results were similar to those of restaurant facilities. Full confidence in fast food from street food stalls had only 10.7% and trusted with reservations 53%. Not trusting at all was 36.3% of the survey group. The paradox is that, according to **SITA (2008)**, even 10 years ago, when the street food stalls were not so numerous, half of Slovaks visited these facilities regularly.

In case they were pre-prepared frozen meals (**Figure 9**), up to 43.5% did not trust them. With full confidence was only 7.3% and almost half of the respondents was trusting them with reservations. Considering that the overwhelming majority was not trusting frozen foods, buying such meals was only less preferable alternative for the consumer. On the contrary, respondents from research done by **Barjaktarovi -Labovi et al. (2018)** favored frozen foods, but only 15.6% of the study participants knew that freezing the food did not eliminate the potential hazard due to various microorganisms.

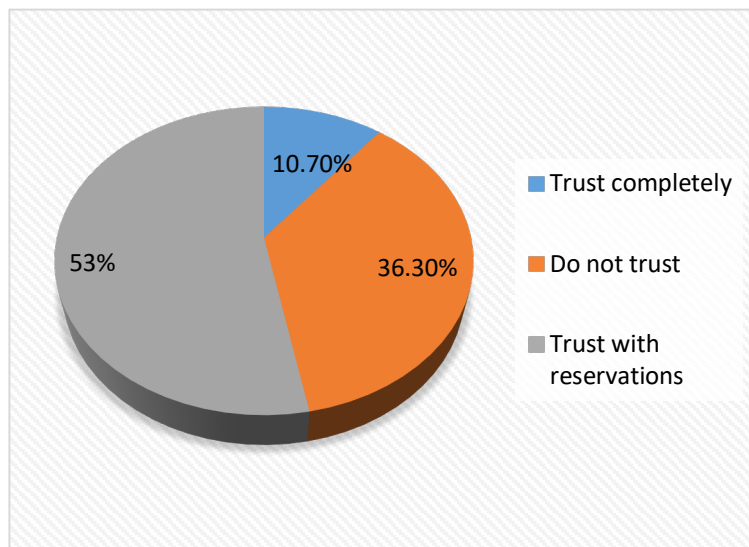


**Figure 7** Confidence in satisfactory hygiene in restaurant facilities.

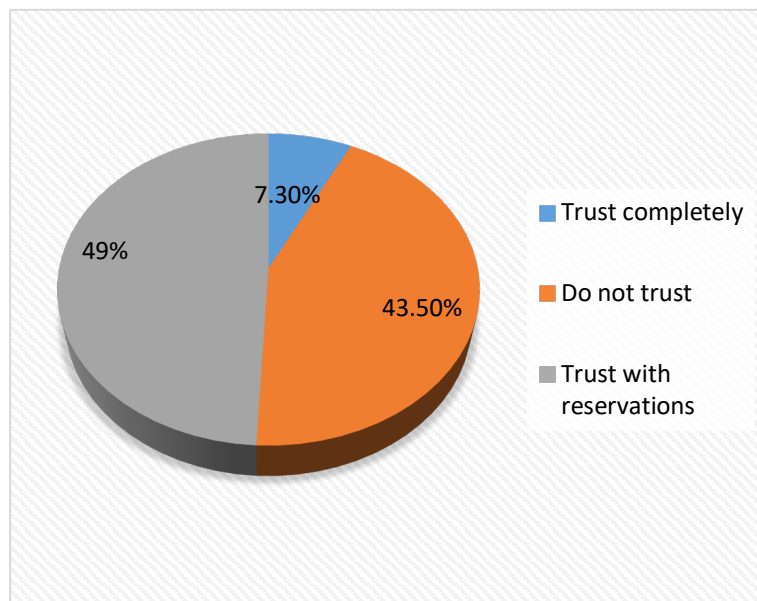
Source: own research

The penultimate question was focused on the form of punishment that should be given to a guilty party that threatens people's health with contaminated food. A radical solution in the form of a ban on activity was preferred by 61.9% and suspension of activity selected 19.5% of respondents. These respondents are aware that endangering the health of consumer is a serious offense, and such solution would prevent the subject from harming the health of another consumer in the future again. Another 25.6% of the respondents opted for a fine. The lowest percentage of respondents (11.6%) preferred dismissal from employment as solution. Often, however, a person who prepares food, which has caused health problems to the customer is not at fault. The failure can occur before the preparation of the food itself, so it is always necessary to identify the specific cause, time and place of contamination.

The last question in the questionnaire provided the answer as to whether it is necessary, in the opinion of the respondent, to enact the mandatory professional competence requirements for people working with food. Nearly 90% answered this question positively. It would ensure that, before a person is allowed to work with food, he / she will be adequately trained and familiar with the general professional requirements on qualification necessary to work with food, alimentary infections and food poisoning, sanitation and disinfection in the food industry and special hygienic requirements. Other 10.6% did not think professional competency is important and thought that anyone can work with food with no regard to the training. According to research by **Kendall et al. (2001)**, approximately 72% of managers would be more likely to hire workers trained in food safety, and, of those, 50% would be willing to pay a higher wage to those trained.



**Figure 8** Confidence in health safety of foods sold in street food stalls.  
Source: own research



**Figure 9** Confidence in health safety of pre-prepared foods sold in the frozen condition.



CONCLUSION

Based on the results of this survey, it can be concluded that the health safety of food sold on the Slovak market is insufficient from the viewpoint of consumers, as up to 8.2% of respondents are regularly concerned when buying food and 51.9% have occasional concerns. The greatest perceived risks are intestinal and diarrheal diseases, expired products, mold, heavy metals and food processing hygiene. The poultry meat, eggs and mayonnaise were evaluated as the most hazardous foods because they are subject to a rapid deterioration, especially when the appropriate thermal conditions are not met.

Majority of respondents was trusting the hygienic level of restaurant facilities, fast food and pre-prepared meals sold in frozen condition but with reservations.

An appropriate measure according to 89.4% would be enacting the mandatory professional competence requirements for food industry workers in order to avoid unnecessary failures in food processing. However, in an event that the health of the consumer would be harmed, respondents reckoned that it would be appropriate for guilty to be punished by a ban on activity (61.9%) or by financial penalties (25.6%).

Due to consumer dissatisfaction and frequent food scandals, the state authorities should tighten the legislation on food safety and increase the number of inspections in restaurant and fast food facilities.

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