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THE AVAILABILITY OF FOOD FOR A GLUTEN-FREE DIET AND POSSIBILITIES AT DINING ESTABLISHMENTS

Olga Regnerová[1], Daniela Šálková[1], Pavla Varvažovská[2]

[1] Department of Business and Finance, Faculty of Economics and Management, Czech University of Life Sciences, Prague, Kamýcká 129, 16521 Prague, Czech Republic
[2] Department of Humanities, Faculty of Economics and Management, Czech University of Life Sciences, Prague, Kamýcká 129, 16521 Prague, Czech Republic

Abstract

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The aim of the paper is to evaluate options for customers-consumers with a gluten-free diet (coeliac disease patients) at food establishments on the Czech market. A gluten-free diet is the only treatment for patients with coeliac disease and it significantly affects their health. The availability of food was investigated during February and March 2014 in three types of food operations. These establishments were visited in forty-three urban, rural and non-residential areas, and the availability of food for people with a gluten-free diet was investigated through interviews at 226 facilities. The preferences of the specific group of customers with a gluten-free diet were determined through comprehensive comparative research. The data was collected from February to June 2014, and 441 respondents were interviewed. The survey revealed that the majority of consumers who must follow this diet fall in the age group of up to 40 years old. This age group consists of preschool and school-age children, students and people of working age who frequently eat away from home. The paper deals with the evaluation of the level of public food services used by customers with gluten intolerance and gives some recommendations for improving the availability and offer of food for a gluten-free diet in selected types of hospitality establishments.

Keywords: coeliac, dietary services, gluten-free diet, customer-consumer, public catering

INTRODUCTION

We can found about 50 to 120 thousand citizens (consumers) in the Czech Republic with gluten intolerance, expressed in percentage terms it is equivalent to about 0.5–1.2 % of the population (Hes *et al.*, 2014). There is an increasing number of people with this autoimmune disorder of the small intestine (coeliac disease). Epidemiological studies carried out during the last decade have revealed the fact that coeliac disease is one of the world's most common life-long diseases (Jones and Green, 2010). The general prevalence is up to 1:10–200 (Páv, 2006).

The disease is associated with an increased rate of osteoporosis, infertility, autoimmune diseases, and malignant disease, especially lymphomas (Green and Jabri, 2003). The causes of the disease may be different, for example, the connection between coeliac disease and rachitis (rickets) in children (Saeed, 2013). The disease occurs more frequently at a younger age there may be more triggering factors – stress, sudden change in life, childbirth, surgery, infectious disease, it can occur after a stressful physical or mental experience and other extraordinary events (Kohout and Pavlíčková, 2010). Coeliac disease is considered to be a partly hereditary disease (according to Beňová, 2010, up to 15 % of the children of parents with coeliac disease also have the disease) that affects nearly 1 in 100 people, while 97 % of patients are not diagnosed and treated (Fasano, Troncone and Branski, 2008). Most

patients remain unrecognized by reason of variable clinical presentation (Mattila *et al.* 2013). This means that even despite the introduction of new diagnostic methods, coeliac disease remains poorly diagnosed all over the world and is often an underestimated disease (Makovický and Rimárová, 2011).

A healthy diet is essential and is also part of a healthy lifestyle (Foret and Paděra, 2007). Today, the only effective defence against coeliac disease is a lifelong gluten-free diet. Patients on a gluten-free diet experience substantial and rapid improvement of symptoms (Murray *et al.*, 2004). As Hybnerová, Štofirová and Mikulajová (2013) state, the lack of discipline in eliminating gluten from the diet is typically the main problem in treatment. Available Czech and foreign literature regarding coeliac disease is focused mainly on medical problems, searching for the causes of this disease, basic information on adhering to a gluten-free diet or prescriptions-recipes for a gluten-free diet. Some of the current knowledge on gluten-free products was found in relation to Commission Regulation (EC) No. 41/2009 of 20 January 2009 on the composition and labelling of foodstuffs for people intolerant to gluten, which sets uniform European rules for the composition and labelling of foodstuffs in terms of gluten content. This Regulation came into force in the Czech Republic on 1 January 2012. The following is required for that:

- food labelled "gluten-free" - gluten must not exceed 20 mg/kg or,
- food labelled "VERY LOW GLUTEN" – gluten must not exceed 100 mg/kg (bezlepkovadieta, 2012).

As the population of the world continues to increase, it will be accompanied by an increase in the demand for food (Řezbová and Škubna, 2012). It is therefore important to provide sufficient food, satisfying the requirements of gluten free diet. The availability of gluten-free foods and ingredients for preparing meals gives coeliac disease sufferers the possibility to modify their diet and enjoy a relatively broad potential for home cooking. The fact that consumers are better educated and more demanding has produced growing demand for healthy and nutritious foods products (Linneman *et al.*, 1999). The growth of public awareness of gluten-related health problems should also help decrease the social phobia of individuals with coeliac disease (Aziz, 2014). Of course, efforts to completely eliminate foods containing gluten from the diet when eating at food establishments can be quite difficult in certain cases. The majority of consumer's regard visiting restaurants, cafés and other food establishments as a completely regular part of the lives. However, for those on gluten-free diets, these visits can represent extremely difficult situations. The simple act of choosing a meal from a menu can become a complicated task to avoid gluten, and can even involve fears over communicating with servers. Some consumers even fear their condition will get worse as the result of innocent mistakes made while eating at a restaurant (Cureton, 2006). In general, it is possible to say, that visiting a restaurant can often amount to a serious health hazard (Bryan, 2012). One way, how to solve problems of food safety, is to introduce modern quality assurance systems which make the traceability of products and their identification possible (Füzesi *et al.*, 2010).

New legislation requiring food establishments to post information on the presence of potential allergens in their meals has improved the situation to a certain extent. While the requirement for operators of food companies to list allergens was introduced into food law in 2003 (Directive 2003/89/EC), until Regulation (EU) No 1169/2011 the provision of food information to consumers applied only to packaged foods. Regulation (EU) No 1169/2011 expanded the requirement to declare information regarding allergens to unpackaged food intended for immediate sale and meals offered in all types of common food establishments (e.g. restaurants, fast food restaurants, cafés, patisseries, cafeterias, etc.) (SZPI, 2015). The EU regulation on consumer information introducing the requirement to also label allergens in food establishments was rated favourably by 72.3 % of a total number of 960 respondents – coeliac disease sufferers addressed during research conducted by the Department of Trade and Finance.

The Czech legal code defines the provision of food services in the following way: "Food establishments include the production, preparation and delivery of food by the operator of a food business for the purpose of operating a food service trade, providing meals to employees, serving refreshments and for serving meals as part of accommodation and tourism services" (Section 23, Act No. 258/2000 Coll.). The offer of dining services extends beyond the domestic internal market to include the broader framework of tourism. The European concept puts accommodation and catering services in the position of basic tourism services (Orieška, 2010).

MATERIALS AND METHODS

The empirical basis was composed primarily of data from the Czech Statistical Office, Eurostat, the Czech Ministry of Health and medical studies on the influence of specific foods on patients' health. Given the subject, an investigation was carried out also through field research using individual interviews as well as a questionnaire survey. This investigation was based on and linked to the previous survey of suitable food supply for customers with gluten intolerance in retail and the survey "Consumer preferences when buying food for coeliac sufferers-consumers with gluten intolerance (gluten-free products)."

Autoimmune diseases of the small intestine from gluten intolerance occur predominantly in persons of younger age. Therefore, the availability of food was investigated during February and March 2014 in three types of operating units of dietary services:

- fast food
- restaurants with waiting staff and
- closed (half-closed) forms of public dining (school, company cafeteria, etc.).

It was a random selection of restaurants to check the availability of food for gluten-free diet. These establishments were visited in 43 urban, rural and non-residential areas throughout the Czech Republic and the availability of food for people with a gluten-free diet was investigated through checking the contents of the menu (including information on potential allergens) and interviews with staff in 226 facilities. Of the total number of facilities 23 % were of fast food restaurants, 56 % and 20 % of closed eateries.

Determining the preferences of the specific group of customers with gluten-free diet in relation to the examination of selected factors that are major determinants of their demand and decisions when purchasing dietary services, was carried out through comprehensive comparative research with a combination of quantitative and qualitative research. First, a pilot survey was conducted on the sample of 50 respondents. After adjusting two improperly formulated questions, the questionnaire in final form consisted of a total of 19 questions. The first five questions were focused on respondents' profile. Questions 6-16 mapped celiac preferences when visiting restaurants and the last three questions were related to the contribution of health insurance companies on a gluten free diet. Three questions were open. Due to the specific group of people - celiacs, the set of potential respondents was obtained directly by addressing individuals with celiac disease in partnership with and using contacts of patient associations. The questionnaire was distributed partly in person, partly in electronic way and it was intended for people who have experience with gluten free diet. The data was collected from February to June 2014. A total of 467 patients were interviewed, including celiac patients who were either diagnosed with celiac disease or just adhere to the gluten-free diet. 26 questionnaires had to be eliminated. After reduction of questionnaires the data matrix was developed. Selective statistical set of respondents (n = 441) is represented by the gender: female (71 %), male (29 %); by the age: 15–19 years (12 %), 20–40 years (72 %), 41–60 years (33 %), more than 61 years (3 %).

The result of the investigation carried out is categorical data (qualitative characteristics) that is not directly measurable and is therefore expressed in verbal form. Analysis of the qualitative characteristics most often focuses on assessing the relationship between two characteristics, with the help of so-called contingency tables. They are two-dimensional tables that are formed by classification according to two variables A and B. The analysis of contingency tables is based on conducting tests of non-correlation (whether there is a correlation between characteristics), and in establishing strength (closeness) of the correlation. The test, which was used to verify the non-correlation, compares compliance of the observed and expected frequencies (Hindls, Hronová and Seger, 2007).

The data obtained from the questionnaire survey mostly have the character of the qualitative traits. If the data set is sorted according to the values (or variations) of two categorical variables, the result is known as a contingency table. This table is the starting point for studying the relationships between these variables. If the data classified in the contingency table originates from a sample acquired by random selection from the basic population, the possibility to generalize the results obtained from a sample of the entire population should be verified. Test procedures are used for this purpose, which verify the statistical significance of the relationship between the selected categorical variables, i.e. the existence of dependencies. The primary test used to detect the interdependence is the chi-square test of independence. The hypothesis is tested that the observed variables are independent. It is assumed that if two traits are independent, the frequency distribution in the contingency table is proportional to the row and column marginal frequencies. The test criterion is generally defined as:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{s}\frac{\left(n_{ij} - o_{ij}\right)^2}{o_{ij}}$$

where n is sample size
n_{ij} – empirical frequency,
o_{ij} – the expected (theoretical) frequency,
i = 1, 2, ..., r, where r is the number of single trait permutations,
j = 1, 2, ..., s, where s is the number of second trait permutations.

χ^2 statistics expresses the concordance between the frequencies obtained by sorting data in the contingency table (n_{ij}) and the frequency expected in the case of independence variables (o_{ij}) (Pecáková, 2011).

The theoretical frequency is estimated based on the corresponding peripheral (marginal) frequencies and sample sizes. The χ^2 statistics, when the null hypothesis is valid, has the chi-square distribution with (r–1) (s–1) degrees of freedom. The hypothesis of independence between the traits will be rejected at α significance level, if the test criterion value is greater than 100 (1–α) % quantile of the chi-square diastribution, or if the minimum significance level for rejection of the hypothesis tested (p-value) is less than α (Mark *et al.*, 2013).

If the hypothesis of independence of traits is rejected at the selected level of significance, the test demonstrates dependence between the traits. Further evaluation of the contingency table should

include identification of the degree of dependence intensity between the traits. The aim of measuring the intensity of dependence is to get an idea about the extent to which the behavior of one variable can be used to deduce the behavior of the second variable (Pecáková, 2011). The strength (intensity) of dependence of two categorical variables can be evaluated using Pearson's contingency coefficient

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}},$$

which in the case of independence is zero. The value of this coefficient is influenced by the population size and dimensions of the contingency table. With the increasing number of rows and columns in the table, the maximum coefficient gets closer to one, but its interpretation is impaired by the dependence on the contingency table size (Mark *et al.*, 2013).

The degree of dependence can also be evaluated using the Cramér's contingency coefficient which is zero in the case of independence. In other cases, it takes values from the interval <0, 1>.

$$V = \sqrt{\frac{\chi^2}{n(h-1)}}, \text{ where h = min. (r, s).}$$

The statistical program SAS 4.9 was used for statistical processing of the correlation of qualitative characteristics.

The aim of this paper is to evaluate the level of public catering for people with a gluten-free diet. A secondary aim was to map celiacs dining options from the perspective of dishes in certain types of establishments - restaurants and closed premises. The second objective was to map out the criteria that are important for deciding of celiacs during visiting the restaurants. That contribution deals with analysis of only selected parts conducted research.

RESULTS AND DISCUSSION

Results

No dishes for a gluten-free diet were available on the menus of fast food types of establishments. It was necessary to make an inquiry to the waiting staff and ask for information and recommendations for what food would be suitable for a gluten-free diet. In this type of establishment, most of the offered dishes are a combination of meat, vegetables and dressing inserted into a white bakery product. It was not possible to switch the composition of the offered food, for example, white bread for gluten-free bread, because gluten-free bread is not on the menu and the composition is fixed. The term coeliac sufferer and its content was not known in a number of visited fast food establishments.

Unlike fast food establishments, the staff of restaurants with waiting staff was relatively well prepared in terms of dishes for customers-guests with a gluten-free diet and with knowledge of the matter, the staff could advise the customer properly in the selection of food. In a number of restaurant type establishments with waiting staff, guests can choose at least one dish from the daily menu, or even more dishes suitable for a gluten-free diet, or a combination of other dishes to get such a menu (e.g. by changing the side dish), or some of the dishes offered containing gluten can be prepared as gluten-free. In some establishments, gluten-free dishes were marked on the menu with a crossed grain. The problem for guests-coeliac sufferers is eating out in small urban or rural neighborhoods. If a restaurant with waiting staff is located in an area with low frequency or small movement of population, usually one or two hot dishes with soup (not necessarily gluten-free) are offered or a dish to order or cold dish, which is usually served with a bakery product containing gluten.

In the closed form of public catering such as school canteens, university canteens, company cafeterias, etc., dishes on the menu for people with coeliac are not marked as gluten-free. In all visited establishments, where the dishes are cooked and served, the staff was mostly friendly and helpful to diners-coeliac sufferers and willing to give advice and combine ready-made dishes to make them suitable for people with coeliac. In particular, this willingness was reflected in school canteens, including nursery schools. If there are students in a nursery or school who need a gluten-free diet, the staff of the school canteen is ready to cook one dish that meets the requirements of this diet or change an appropriate gluten-free side dish or warm food that children bring from home.

The consumption of food is part of human nature and an essential condition for life. Food consumption is a joyful and pleasureful activity, one that is often perceived by consumers as something deserving greater attention, especially in connection with health (Nagyová *et al.*, 2009). Naturally, a whole line of additional related aspects must be taken into account. In the case of coeliac disease, this process is considerably more complicated for the consumer.

While watching the correlation of age and economic status of consumers - coeliac sufferers in relation to the frequency of eating out in eating establishments (TAB. 1) correlation was demonstrated (level of importance $\alpha = 0.05$). The strength of the correlation is assessed as low.

Age and, in relation to it, the economic activity of the person is directly related to the intensity of use of the services of restaurant establishments (correlation was proven – Chi-square 0.0282). The strength of the correlation is assessed as low (Cramer's V 0.1188). Although with varying degrees of intensity, persons aged 20–40 years (74 %), followed by persons 40–60 years old, i.e. working age people mostly with income from employment or other gainful activity (total 87 %), dine out in restaurants. Persons younger (under 20 years) and

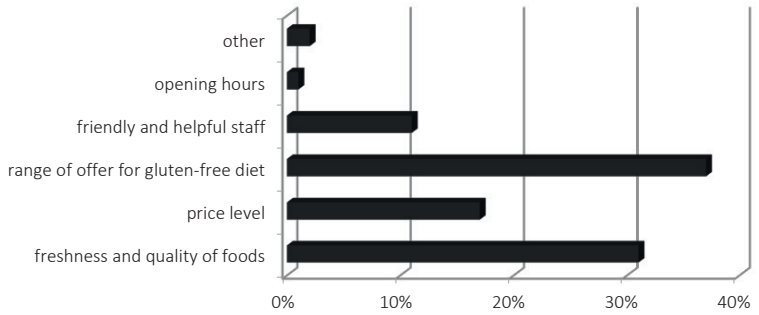
I: *Correlation between age and frequency of eating in restaurants*

Age	Frequency of eating in restaurants				
Expected Frequency	**less than once per week**	**1x per week**	**every day**	**every other day**	**Total**
under 20	22 5.0 %	11 2.5 %	12 2.7 %	1 0.2 %	46 10.4 %
20-40	152 34.5 %	80 18.1 %	43 9.8 %	54 12.2 %	329 74.6 %
40-60	36 8.2 %	16 3.6 %	2 0.5 %	2 0.5 %	56 12.7 %
60-80	6 1.4 %	2 0.5 %	1 0.2 %	0 0.0 %	9 2.0 %
over 80	1 0.2 %	0 0.0 %	0 0.0 %	0 0.0 %	1 0.2 %
Total	**217** **49.2 %**	**109** **24.7 %**	**58** **13.2 %**	**57** **12.9 %**	**441** **100 %**

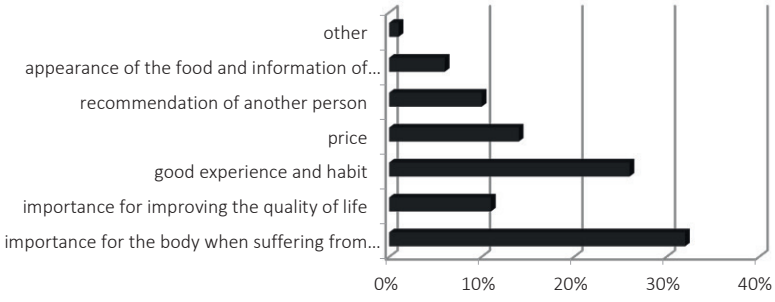
persons older than 60 years of age mainly have their meals in other ways.

The questionnaire survey shows that most visited type of eating establishments for customers with gluten-free diet are unequivocally restaurants with waiting staff (69 %). The basic criterion by which these customers choose a specific establishment is the range of dishes for a gluten-free diet and the freshness and quality of food, followed by the price level, friendly and helpful staff, and less so the operating time (FIG. 1). This question is answered only by people who visit the restaurant. The aspect of accessibility and remoteness (even among the important criteria) was therefore not taken into account.

When selecting a particular dish, the aspect of health plays a major role, which is understandable, if a gluten-free diet needs to be followed. Customers further make decisions with regard to previous good experience, or individual preference of the given of food and the price, as the third most important element. The recommendation of another person for an unknown, yet untried dish as well as the appearance of food and any explanatory information of the waiting staff also play a role (FIG. 2). The quality of gluten-free food is most often assessed by its composition (62 % of customers), good personal experience (59 %), and even the recommendations of others (26 %) have a considerable influence. When looking at



1: *Influence on the decision in the selection of an eating establishment*



2: *Decisive criteria when purchasing a particular food for a gluten-free diet*

the perception of the overall price level, the price of special gluten-free food is classified to a large extent as high by this group of customers (80 %). As other research has shown, coeliac disease in general is a heavy economic burden for patients (Long *et al.*, 2010), as gluten-free products are significantly more expensive than comparable traditional products (Stevens and Rashid, 2008). That is also the reason why discounts and price reductions, according to the statement of persons interviewed, play a very large role for 28 % and a partial role for 51 % in deciding whether to visit a restaurant establishment. Thus overall, special price offers are significant for 79 % of customers surveyed. Price reductions play a small or almost no role only for 23 % of people with a gluten-free diet.

When monitoring the correlation of frequency for persons following a gluten-free diet when eating out in eating establishments in the Czech Republic and the importance of discounts or price reductions when buying gluten-free foods, correlation was proven (Chi-square 0.0067). The strength of the correlation is assessed as low (Cramer's V 0.1313). It means that the intensity of use of public catering directly relates to the offer of discounts and price reductions.

There is limited availability of gluten-free foods and the cost and availability of a gluten-free diet has been cited as a cause of incomplete dietary compliance (Singh and Whelan, 2011). Given that a predominant group of persons interviewed (83 %) with a gluten-free diet considers the current range of gluten-free food offered in public catering as insufficient, 94 % of customers would like to see a new (innovative) eating establishment with an expanded assortment of gluten-free dishes in the nearby vicinity. In most cases, it should be an establishment with waiting staff or self-serve, specialized or niche business. Respondents also cited examples of foods that in their opinion are lacking most in the menu of gluten-free dishes in restaurants.

DISCUSSION

Existing investigations have shown some recommendations for improving the availability and offer of food for a gluten-free diet in selected types of hospitality establishments:

- focus catering services for celiacs in particular on the age groups of 20–40 and 40–60 years old (with own income), which most often eat out,
- provide information on the provision of gluten-free dishes in advance and to appropriately indicate, for example, on their website, including the price (weekly menu) so that customers-coeliac sufferers can make a decision on how and where to eat,
- improve the overall familiarity of the waiting staff with the diet of coeliac sufferers; in terms of restaurants with waiting staff it was mostly good, in other types of establishments it was weak; therefore, staff, particularly new and temporary workers need to be prepared before starting their jobs and familiarized with what a gluten-free diet encompasses,
- add to and expand the menu with other dishes (not only a plain cut of meat served with potatoes and vegetables as the offer for coeliac-sufferers often turned out to be), with the possibility to alter (prepare) meals and change side dishes to make them suitable for a gluten-free diet; mark gluten-free dishes on the menu by a "crossed grain",
- in terms of fast food types of establishments, eating at them daily would be too one-sided not only for those who have coeliac disease, because in a large percentage of the visited establishments the daily menu is always the same; therefore, even in this case, it is recommended to have a variation of dishes and include bakery products made from gluten-free flour even at the cost of an extra charge,
- in terms of large capacity cooking facilities supplying food to company cafeterias, offer one meal without gluten or the possibility to change a side dish in the weekly menu,
- take advantage of a location with new job opportunities, with the establishment of a new school, etc. (including cooperation with companies, institutions) to create a new establishment (innovated) that would offer gluten-free and other diets (focus its marketing strategy on it),
- prepare interesting price offers, such as introductory prices for new establishments and establishments with new or innovated selections of dishes for the specific customer group with a gluten-free diet; to target advertising on it (promotional flyers, tasting sessions e.g. gluten-free pie, etc.).

CONCLUSION

Results of the field and questionnaire survey showed unevenness in representation of offers of selected dishes suitable for consumers following a gluten-free diet. The situation on the Czech market from this point of view is not satisfactory. Despite the growing number of people who need or seek a gluten-free diet in terms of healthy eating, this situation is not adequately addressed by the majority of establishments. The findings reported in this paper resulted from the solution of a part of the project "The availability of food for celiacs (gluten-free diet) in hospitality establishments in the Czech Republic and their social responsibility to the monitored group of consumers." Therefore, in conclusion it is important to remind and emphasize that there is space for corporate social responsibility towards this group of people with a gluten-free diet and program-wise it should be part of the business strategy of companies that are directly or indirectly involved in the provision of catering services. Not only companies that directly provide catering, but also health insurance companies (problem-free contribution to the dietary needs of persons diagnosed with coeliac disease) and also companies and institutions involved in catering for their employees. Responsible behavior of companies to their surroundings has a positive effect on employee loyalty, the reputation of the company and brings the company a competitive edge and thus sustainable development.

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Contact information

Daniela Šálková: salkova@pef.czu.cz
Olga Regnerová: regnerovao@pef.czu.cz
Pavla Varvažovská: varvazovska@pef.czu.cz