

Original Paper

Consumer Responsibility for Food Safety

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Abstract

Nowadays, food safety and quality have a key role in maintaining the health of consumer, as the ultimate link in the food chain. Foodborne diseases can be a problem for every individual, but are particularly important to children, the elderly, and immunocompromised individuals. Although food hygiene experts widely accept many cases of foodborne disease occur as a result of improper food handling and preparation by consumers, the consumers themselves are still not aware of this fact. Correct personal hygiene measures are a well known step facilitating reductions in the risk of these diseases. However, actual implementation of personal hygiene and sanitation behaviors at home remains insufficient. The aim of many studies is to assess consumers' knowledge of food security and to determine whether that knowledge is applied in practice. Such information can be of great help to professionals who deal with education of consumers about food safety, should help promote the principle among consumers that they themselves have a critical role in reducing the risk of foodborne disease.

Keywords

consumer, food safety, nutrition, culture, food hygiene

1. Introduction

Healthy living as a concept developed in the mid 20th century, and as a term, is mentioned in the encyclopedic dictionary by Larousse. Healthy living denotes the preventive, holistic dedication to caring for and maintaining your body, your diet, and your life in general, with maximum attention and according to the knowledge and customs prevailing in a given society at a given time (Baltic et al.,

2010a).

To date, the known and scientifically proven links between diet and health may well reflect mankind's initial hunter-gatherer lifestyle. This diet-health relationship is still the subject of research which produces, not infrequently, conflicting results and conclusions. The results of modern scientific studies on diet-health measures have resulted in a range of dietary recommendations from responsible authorities. While it is undisputed that these dietary recommendations are effective in many cases, there are missteps. Modern food consumption must also be viewed in the context of one of the most important nutritional aspects, that of dietary satisfaction-satiety. A hedonic approach to nutrition leads to uniform and imbalanced food choices and, inevitably, to poor health. The basis of proper nutrition is food variety and moderation (Baltic et al., 2010a).

The truest and best custodians of food traditions are families, i.e., family households. Food tradition contributes to each person's identification with their native land/region, and of course, is mobile, carried as knowledge and experience, no matter where an individual lives. For Serbia, not so long ago a country with a peasant culture, the primary objective of the rural economy was direct maintenance of rural families. The family was the basic economic and consumer unit. Traditional food products were mostly produced artisanally, in small establishments, and a good part of them in family households. A significant proportion of each family's production was intended for personal, family consumption (Baltic et al., 2010b).

Serbia has diverse possibilities for agricultural production due to its land configuration, soil and climate. In agricultural production, animal husbandry has a special role, given the long tradition of raising pigs, sheep and cattle for livestock products, especially food, including traditional meat products (pork, lamb and beef). Meat products that could remain preserved over the winter were produced by, above all, small runholders and peasant households. Today, however, no matter where or how long such products have been traditionally prepared, they must be safe for human health. This is achieved, first of all, by implementing the principles of good manufacturing practice and good hygienic practice (GMP and GHP) and the Hazard Analysis and Critical Control Point (HACCP) system, in which the producer needs to identify hazards which endanger product safety and to eliminate or control them (Baltic, 1998). Nonetheless, in smaller production facilities existing today in Serbia, the HACCP system requires some modifications. For artisanal householders manufacturing traditional products, special regulations modeled on those of the European Union countries and some neighboring countries should be adopted, which would enable these producers to legally place their products on the market (Baltic et al., 2010b). Globalization and industrialization of food requires monitoring and calibrated standardization so that resultant food products are of legally acceptable quality and safety and satisfy consumer choice preferences. The modern approach to food safety also includes complete control of the production process along the entire production chain, from farm to fork. Food safety and quality policy is a set of regulations designed to result in food that will not endanger the health of consumers due to the presence of biological, chemical or physical hazards, above the prescribed level (for some of them

there is zero tolerance). There is no doubt that standardization of food products facilitates food trade, and this applies to national and regional specialties, as well as to ready-to-eat foods. The fact is that all food intended for human consumption must be safe for human health (Baltic et al., 2010b).

Because of growing consumer concerns about food safety, but also growing concern on the part of government bodies responsible for overseeing food safety, more strict regulations and standards to improve food safety are constantly being introduced. All standards proceed from the underpinning fact that operators in the food chain must act in accordance with local legal requirements and respecting internationally agreed rules. Consequently, we can envisage several levels at which different rules are applied, and some examples follow: a) Global-guidelines of the World Health Organization (WHO) and the Codex Alimentarius Commission (CAC); b) Regional-EC No. 178/2002 (Regulation of the European Parliament and of the Council of 28 December 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety); c) National legislation-Serbia's Food Safety Law; d) ISO standards and other standards in the field of food safety-ISO 22000: 2005 Food Safety Management System; e) The internal standards of large corporations, e.g., McDonalds Food Safety System and others (Buncic, 2009).

The application of such rules/standards in food production is desirable and necessary, contributing to production of safe, tradeable foods. These standards are generally in force in Serbia, but unfortunately, their complete and correct implementation in practice remains challenging.

2. Food Safety

Safe food implies food that will not harm the consumer when it is prepared and/or consumed in accordance with the food's purpose. The quality of food can be defined in different ways. Food quality, in a broader sense, with a population of regulations governing this matter, includes hygienic attributes (bacteriological and parasitological properties, the presence of harmful substances, organoleptic conformity) and quality, in the narrow sense, including chemical, physical and organoleptic properties. However, it is often impossible to set boundaries between the hygiene attributes and quality of food. State authorities, producers (company owners) and consumers are all responsible for the ultimate hygiene and quality of food.

The value of the modern approach to food safety is reflected in the fact that it is applicable to all segments of food production or as is commonly said, is applied from farm to fork. However, absolute food safety cannot be ensured or guaranteed, no matter how good, functional, controlled and checked is the system by which food is produced (Lagendijk et al., 2008). The final, controlled segment of the food chain is the retail section, or those sections where ready-to-eat food is made available to the consumer (e.g., catering).

Food security is a concept that refers to technologies and regulations which must be adopted by manufacturers and consumers. Nowadays, especially in developed countries, it is increasingly common

to eat outside the home (e.g., fast food) and to consume food at home which has been completely or partially prepared elsewhere. This is not necessarily the result of the innate popularity of such foods, but could be a logical result stemming from the specific problem of lack of consumer time and their organization of everyday life (Baltic et al., 2010a). However, it may also be due to good marketing and/or food fashion. Consumption is one of the characteristics that define lifestyle in modern society (Davidson 2015). Among United States consumers, 40-50% of revenues intended for food for human consumption are spent on so-called fast food or food outside the home, while people in Europe spend about 26% of their income for the same purpose. The traditional concept of grocery purchasing is constantly changing. The frequency and types of food-borne infections are also changing. Studies have found an increase in viral infections compared to conventional bacterial infections (Raspor & Jevsnik, 2008).

For a proper understanding of the term “food security”, clear coordination and training in the food chain is needed. When it comes to food safety, consumers and producers must speak the same language. This means they have to consider regulations and technical and scientific principles to ensure the safety of raw materials, packaging, and other ancillary materials used in food production and transport. Carelessness, negligence, error or reckless activity in any part of the food chain can be fatal to consumers (Raspor & Jevsnik, 2008).

3. Foodborne Diseases

Foodborne diseases (defined as infectious diseases or those of a toxic nature caused, or those that are thought to be caused, by consuming food and/or water) have become one of the most widespread public health problems in the world today. Foodborne diseases related to microbial pathogens, biotoxins or chemical contaminants in food are a serious threat to the health of millions of people (Baltic et al., 2011).

In most cases, foodborne diseases are related primarily to exposure to biological components, usually bacteria or their toxins (Ivanovic et al., 2014; Ivanovic et al., 2015; Baltic et al., 2015). When these human diseases have an epidemic character, it is understandable that they attract much media attention and consumer concern. Recent outbreaks of foodborne disease and deaths related to commercial food preparation have attracted great media attention and public focus (Bielaszewska et al., 2011). As a result of such outbreaks and the media consideration they garner, consumers can develop an increased concern about the safety of commercially prepared food. Foodborne diseases are not only a danger to human life and health, but also cause huge economic losses to individuals and companies (e.g., sick leave, medical treatment). The real frequency of foodborne disease is difficult to determine because individual cases of disease, as opposed to outbreaks, are rarely reported. While foodborne diseases can be serious and fatal, mild cases are often not detected through routine surveillance. It is believed that most (95%) cases of foodborne disease are sporadic. These sporadic cases and small outbreaks originating from households typically involve individuals or a small number of people and, therefore,

are less likely to be identified by the competent public health authorities. Therefore, the actual number of foodborne disease outbreaks and individual cases originating from households is likely much higher than reported (Redmond & Griffith, 2003).

Over the past decade, more than 87% of reported cases of foodborne disease in the UK, Europe, Australia, New Zealand, the United States, and Canada were in connection with food which was prepared and consumed at home. Most consumers are unaware that at least 60% of cases of foodborne disease are caused by food preparation at home, believing that the cause of such poisoning is the commercial food manufacturer or meals in restaurants (Worsfold & Griffith, 1997). Historically speaking, the most common cause of reported foodborne disease outbreaks related to households is *Salmonella* spp. Many of these cases are related to common mistakes in the implementation of hygienic practice during food preparation at home (Gillespie et al., 2001). Epidemiological studies have shown that sporadic cases or small household outbreaks make up the majority of food poisoning incidents. It is estimated that foodborne disease related to households in the UK accounts for more epidemics than those from all other reported places together (Baltic et al., 2011; Redmond & Griffith, 2003).

Prevention of foodborne disease requires cooperation at all stages of the food chain. There is no exclusive blame or liability at any stage of the chain. Effective food safety strategies to reduce the risk of contamination with pathogens require a dual approach to integrate education and legislation. At the international level, the priority is the implementation of legislation in all sectors of various food industries and the development of educational awareness of consumers. In the UK, the primary objectives of the authorities responsible for food safety include the protection of public health and consumer interests. Similarly, in the United States, the food safety system is based on the interaction between federal organizations such as the Department of Agriculture, Ministry of Food and Drugs, Department of Inspection and Food Security, Department of Health and Human Services, Environmental Protection Agency, and the Protection and Inspection Service for Animal and Plant Health. In Australasia, an independent organization known as the Australia and New Zealand Food Authority (ANZFA) cooperates with other authorities to help protect public health and safety through maintaining food safety in the supply chain (Grunert, 2006). Clearly, since all parts of the food chain are involved, since the majority of foodborne disease originates from households, and since it is impossible to provide and guarantee absolute food security, it is necessary to start educating consumers. Moreover, laws alone do not fully enable protection of society against foodborne disease (Anon, 2009).

4. Consumer Awareness and Education

Food safety control practically stops at the moment when food is transferred into the consumer shopping trolley. The key reasons for the high incidence of foodborne diseases related to households are linked to consumers' lack of knowledge and awareness of their own responsibilities (Janjic et al., 2015). The contemporary consumer needs to be informed of the potential hazards that can occur in food, the maintenance of hygienic kitchen work spaces and personal hygiene, contamination routes,

safe food handling (storage conditions and shelf life), food preparation methods and safe storage of cooked food (Baltic et al., 2012).

The importance of good practice during the preparation of food in households with regard to foodborne diseases is supported by epidemiological data. Studies have shown that the main factors influencing occurrence of epidemics of foodborne disease are, generally, inadequate storage, cooking, or reheating, plus cross-contamination. Also, 25% of reported outbreaks of foodborne disease are caused by inadequate food handling by consumers, as well as bad practices during food preparation in households (McCabe-Sellers & Beattie, 2004). Although the theory that many cases of foodborne disease occur as a result of improper handling and preparation of food by consumers is accepted by many food safety experts, consumers themselves are still unaware of this fact (Baltic et al., 2012).

The HACCP system (or at least elements of it), which constitutes the main food safety system in food production today, is now implemented along the food chain, with the single exception of in households. In the classic, modern strategy for ensuring food safety in the food chain, the consumer remains the exception, as being outside the system (Raspor, 2008). Good practice in households is still neglected in spite of the significant proportion of foodborne diseases that occur as a result of food preparation in homes. Good practice in households covers all hygienic principles and techniques from food supply to food consumption in the household. The most common problem that arises is inappropriate personal habits.

Consumers must be informed about the ways in which cross-contamination occurs. Pathogens are continuously introduced into the home environment, especially via food, people and pets. In addition, work surfaces, especially hands and food contact surfaces are the main routes of pathogen transmission. Numerous bacterial pathogens such as *Escherichia coli*, *Clostridium difficile* and *Shigella* spp. can survive for months on dry surfaces, and even longer on wet surfaces (Kramer et al., 2006). Hygienic practices in households, especially the use of moist sponges, dishcloths, and mops can contribute to the spread of pathogens on work surfaces or directly to hands, leading to cross-contamination of bacteria and posing a potential risk that the bacteria can survive or proliferate in food (Janjic, 2014).

In recent years, growing consumer interest in good practice as related to food in households has been noted. This is the result of increasing knowledge and awareness of the links between pathogen-contaminated surfaces, pathogen transfer and treatment, particularly in the home kitchen environment. In kitchens, large numbers of pathogenic bacteria were found, and some locations were highly contaminated.

The importance of proper food handling practices by consumers is widely recognized among experts. A large number of studies are also conducted in the production, processing and distribution in the food industry. However, the consumer is, and remains, the least studied link in the food chain, and this is, unfortunately, combined with the fact that information about consumer habits and knowledge of food safety is considered to be largely unreliable. However, even in today's modern households, a significant amount of food is still prepared, so research into consumer education/knowledge of the risks

caused by unsafe food handling practices is an essential element for actually preventing foodborne disease (Konecka-Matyjek et al., 2005; Janjic et al., 2015b).

The information about food handling in households comes from two main sources: analysis of foodborne disease outbreaks and research based on consumer studies. This latter type of research constitutes study of consumers to assess their application of safe food handling practices. These studies have adopted different approaches to research, including questionnaires and interviews, discussions in target groups, and observational studies. Epidemiological studies provide quantitative data on the contribution that unsafe food handling makes to foodborne disease. However, retrospective analysis of foodborne disease outbreaks or cases provides limited information on consumer food safety-related behavior. The accuracy and availability of appropriate data/information can be limited because people often find it difficult to remember exact details regarding their own consumption of food and food handling practices, and such details can have a significant effect on disease occurrence (Marklinder et al., 2004; Janjic et al., 2015c). The ultimate purpose of consumer studies as related to foodborne disease is to determine what proportion of foodborne disease outbreaks are due to improper handling of food in households and to determine what consumers know about food safety and why some safe food handling practices are applied and some are not (Tucker et al., 2006).

Awareness of consumer knowledge, attitudes, and behavior should provide the basis for formulating educational/promotional programs about consumer health. Only when consumers are informed about good food safety practices will it be possible to plan effective strategies to build and strengthen desirable consumer behavior in connection with food preparation in households. The use of models of social learning about health problems has enabled the identification of relationships between attitudes, beliefs and behaviors, and behavioral change (Tucker et al., 2006).

Accordingly, while research has focused on food production, processing and retailing, relatively little research has been conducted to investigate the knowledge of consumers about food safety, and their application of good practice in the preparation of food in households. Such research is required in order to determine gaps in consumer knowledge about food safety, to reveal the hygiene mistakes that occur most frequently in domestic kitchens, and to design effective educational programs tailored to fill such gaps. In the past decade, most of the research on consumer knowledge of food safety was conducted in Great Britain and Northern Ireland or in the United States (Redmond, 2002). Questionnaires and interviews were the most common method of data collection, and were used in 75% of studies. The published research also used focus groups, as well as observational tests (Redmond, 2002). Some information about consumer habits and the implementation of safe food-handling practices were collected, showing that a significant number of consumers often utilize unsafe food handling practices. Moreover, self-reported knowledge, habits, implementation and independent experiences did not correspond to consumer behavior when it was observed, indicating that observational tests are better indicators of consumer food hygiene in practice. Continuous effort is required in the development and implementation of strategies for consumer education related to food safety in order to improve specific

behaviors that contribute to reducing the incidence of foodborne disease (Redmond, 2002).

The food hygiene and security measures implemented by consumers have a crucial role in preventing foodborne diseases, because they constitute the final step in the process of food preparation. Therefore, safe food handling by consumers in households must be considered to the “last line of defense” in food production and consumption (Raspor, 2008).

5. Conclusion

Global food security will be achieved only when each link in the food chain in its entirety (in both internal and external environments) has the appropriate level of expertise. Only properly implemented, in-depth knowledge will ensure that the activities that precede and follow within food safety from farm to fork, without neglecting the final step, the consumers, contribute to the production of safe food. Consumers should continue to be made aware of the potential risks of improper food handling and preparation, and of the desirability of ensuring safe and balanced daily meals. Naturally, this includes educating consumers in food safety and food-related diseases. It would also be useful if key stakeholders pay more attention to the fact that consumer education must be on-going, to cover lesser-known and emerging pathogens. Public opinion in the field of food safety will play a key role in such consumer education.

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