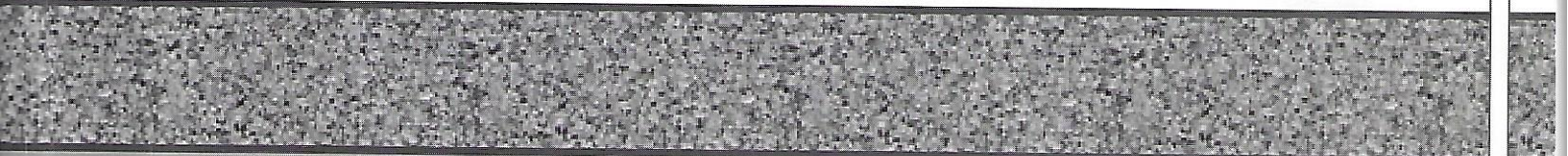




Biological Food Safety & Quality

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Food safety and quality at consumer level

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Introduction

Modern food safety system is based on the hygiene of the production process and prevention. It is supported by scientific and regulatory bodies, and legalized in all developed countries. This system is used in Serbia. The modern food safety system is based on good practice (GMP/GHP) and HACCP. Food manufacturers are responsible for its implementation. Manufacturers must identify the hazards, and control or eliminate them, to provide products (food) that will be safe for consumers. The value of the current approach to food safety is reflected in the fact that it is applicable to all segments in its production “from farm to fork”. It is understood that food security depends on the defined system security operating in all segments of food production. Because of that this system should be controlled and checked. The final controlled segment of the food chain is retail of food or a place where food becomes available to consumers (restaurants, for example). The absolute safety of food, however the system is good, functional, controlled and checked cannot be ensured and guaranteed. The law is never completely able to protect society, or more simply, “life is broader than any regulation”. The proof of this statement are occasional epidemics such as *E. coli* O157 from 2011 in Germany. Foodborne diseases are not rare and they are in most cases related to biological hazards, primarily bacteria. If these human diseases have an epidemic character, it is understandable that they attract considerable media attention and consumer concern. Foodborne diseases are not only a threat to the health and lives of people, they also cause huge economic losses (sick leave, medical treatment). Analysis of the prevalence of disease caused by food shows that consumers can be responsible for their occurrence. Food safety control stops the moment consumers put food in the shopping cart. Limited knowledge and education of consumers are the key reasons for the high incidence of foodborne diseases which are related to households. Consumers must have knowledge and be informed about the dangers in food, hygiene workspace and personal hygiene, routes of contamination, food handling (storage conditions and shelf sustainability), method of food preparation and storage of prepared food and the importance of removing food waste. Most consumers are unaware that at least 60% of cases of foodborne diseases are caused by cooking at home (domestic food preparation).

Consumer awareness

On the basis of product declarations, consumers can acquire basic data related to food safety. Product declarations give information about storage conditions and expiration date, and sometimes about usage. Usually consumers can be informed about food safety via public information. Unfortunately, mass media sometimes tends to sensationalise rather than be objective. Thus, consumers can become fearful rather than becoming acquainted with the problem, which is the role of information resources. The task of information media is to educate consumers (TV, radio, or by professional, popular newspaper articles) which are aimed at a wide range of consumers. More than half of our consumers (52.06%) believe that they are not sufficiently informed about food safety in Serbia, 40.18% of them believe that they could be better informed, and only 7.76% of consumers believe that they are well informed about food safety (Baltic, 2001). Kennedy et al. (2005) reported that 52.1% consumers learn correct food safety practices from their parents or grandparents, school (28.4%), general experience (25.6%), TV (21%), newspapers or magazines (16.6%), work (8%), tertiary education (6.5%), brochures (5.7%), friends (4.9%), cooking classes (4.3%), food safety agencies (2.9%), radio (1.8%), medical doctors (1.1%), and Internet (0.5%).

Microbial hazards in food

Consumer surveys can provide an insight into their knowledge about microbial hazards in food. Respondents reported having heard of *Salmonella* (92.9%), *E. coli* O157 (77%), and *Listeria monocytogenes* (45.2%). A range of other pathogens, such as *Campylobacter*, *Bacillus cereus*, *Staphylococcus aureus*, *Clostridium perfringens*, *Cl. botulinum*, *Yersinia enterocolitica*, and viruses, were

reported as known; <20% in each case. In general, respondents had limited success in associating pathogens with particular foods. The most frequently reported association was between *Salmonella* and eggs (44%). Some of the other associations reported included *E. coli* O157 and beef (38.7%) and *L. monocytogenes* and soft cheese (28.1%) (Kennedy et al. 2005). Despite perennial and frequent warnings via public information campaigns in Belgrade, Serbia, 13.90% of consumers still do not know that pork should be examined for the presence of *Trichinella* (Baltic et al., 2001).

Cleaning work area and personal hygiene

A new interest has arisen in household practices as a result of the understanding that a link exists between contaminated inanimate surfaces and disease transmission and acquisition within settings such as the home. Domestic sanitation practices, especially those employing wet sponges, cloths, and mops, have been found to further disseminate bacteria to other inanimate surfaces and directly to the hands, leading to cross-contamination with bacteria and the potential for bacteria to reach foodstuffs and the mouth. Many cases of food poisoning originate in the domestic environment and can be associated with improper food handling and ineffective hygiene by consumers. A number of pathogenic bacteria were found in kitchens and some sites were highly contaminated. Refrigerator door handles are used frequently but are not regularly cleaned. It is not therefore surprising that of the five sites they sampled, Haysom and Sharp (2005) state “the highest mean *Enterobacteriaceae* count was found on the refrigerator handle ($6.1 \times 10^4 \pm 4.2 \times 10^3$ CFU ml⁻¹).” Accumulated dirt and grime in recessed areas of door handles was considered to produce a hygiene risk especially for children whose small fingers would penetrate further. Microbial analysis of domestic refrigerators revealed *E. coli*, *Salmonella* spp., *Campylobacter* spp., *Y. enterocolitica*, *L. monocytogenes* and *S. aureus* (Kennedy et al., 2005). The average TVC and TCC in domestic refrigerators were 7.1 and 4.0 log CFU/cm², respectively. A number of the target pathogens were detected in the sampled refrigerators (i.e., *S. aureus* [41%], *Salmonella* spp. [7%], *E. coli* [6%], *L. monocytogenes* [6%], and *Y. enterocolitica* [2%]). *Campylobacter* spp. and *E. coli* O157:H7 were not detected. Fifty-two percent of refrigerators contained at least one of the aforementioned pathogens. Foodborne illnesses pose a problem to all individuals but are especially significant for infants, the elderly, and individuals with compromised immune systems. Personal hygiene is recognized as the number one way people can lower their risk. Little is known, however, about actual application of personal hygiene and sanitation behaviors in the home. The task of many studies has been to assess consumer knowledge of food safety and determine whether individuals’ reported beliefs correspond to their applied actual practice. This information can aid food safety and other health professionals in targeting food safety education so that consumers understand their own critical role in decreasing their risk for foodborne illness.

Cross-contamination

Consumers need information about how cross-contamination occurs. Pathogens are continuously introduced into the home environment, especially via people, food, and pets. In addition, inanimate surfaces, and especially hand and food contact surfaces, are a main route of pathogen transmission (Kramer et al., 2006). A number of bacteria such as *E. coli*, *Clostridium difficile*, and *Shigella* species can survive for months on dry surfaces, and longer on wet surfaces. Progress in resolving or reducing the risks involved in failures in consumer food safety practice is dependent on correctly identifying the hygiene errors that consumers make in their own kitchens and on developing education or information strategies that get the corrective messages and practices to consumers, or to relevant subgroups of consumers (Beumer et al., 2002).

Food storage

After a chilled product is removed from a retail display cabinet it is outside a refrigerated environment whilst it is carried around the store and then transported home for further storage. In the home it may be left in ambient conditions or stored in the refrigerator until required. There has been significant concern in recent years over the role of inadequate temperature control and handling in the home in the number of food poisoning incidents (James et al., 2008). In a survey of 100 refrigerators, 71 had average temperatures above 5°C. Analysis showed that in 69.9% of refrigerators the warmest place

was in the top and in 45.1% the coolest place was in the middle. However, the top of the refrigerator was not always the warmest and the bottom the coldest place. Bakalis et al. (2003) found the warmest place in the door with the lowest temperature being in the middle position of some refrigerators and the upper tray in others. A higher general incidence of pathogens and higher Aerobic Plate Counts (APCs) were found in urban consumers refrigerators than those of rural consumers, and consumers under 25 were more likely to have one or more pathogens present in their refrigerators. Assessments have shown high APC contamination levels (Jackson et al., 2007). Values ranged from 2.91 to 8.78 log₁₀ CFU cm⁻² with an average of 7.4 log₁₀ CFU cm⁻² in the 342 refrigerators sampled. Almost a quarter of refrigerators yielded coliform contamination levels greater than 3 log₁₀ CFU cm⁻² and *E. coli* was isolated from just over 1% of refrigerator surfaces. The USA survey of 2000 (33% response rate) randomly selected households suggest that women, lower-income households, people 65 years and older, and non-college graduates practice safer food handling methods than men, higher-income households, people younger than 65 years, and college or post-college graduates (Li-Cohen and Bruhn, 2002).

Concluding observations

Knowledge of consumers about food safety concerning the procedures and food handling in households are insufficient, according to various findings. Therefore, food safety agencies should tailor their food hygiene messages to educate consumers about bacterial pathogens and foods associated with them in order to motivate changes in cleaning, chilling, cross-contamination, and cooking in the domestic kitchen. These messages should be targeted at younger audiences (<35 years), and parents should be reminded of their responsibility for teaching their children the fundamentals of food hygiene. Additional consumer education regarding food safety and foodborne illness is needed, and more importantly, implementation of sound personal hygiene practices in the home is needed. Furthermore, attention to consumer education around lesser-known pathogens may be beneficial. Food safety intervention specialists and other health care professionals play a key role as public educators in the area of food safety and preparation.

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References

1. Baltić Ž.M. 2001. Zabrinutost potrošača za kvalitet namirnica, Zbornik referata i kratkih sadržaja, 13. Savetovanje veterinara Srbije, Zlatibor, 93-105.
2. Bakalis S., Giannakourou M. C., Taoukis, P., 2003, Effect of domestic storage and cooking conditions on the risk distribution in ready to cook meat products. In 9th international congress on engineering and food (ICEF9), Montpellier, 7-1.
3. Beumer R., Bloomfield S.F., Exner M., Fara G.M., Kumar J.N., Scott E., 2002, International scientific forum on home hygiene procedure in the home and their effectiveness: a review of the scientific evidence base.
4. Haysom I.W., Sharp, A.K., 2005, Bacterial contamination of domestic kitchens over a 24-hour period. *British Food Journal*, 107(7), 453-466.
5. James S.J., Evans J., James C., 2008, A review of the performance of domestic refrigerators, *Journal of Food Engineering*, 87, 2-10.
6. Jackson V., Blair I.S., McDowell D.A., Kennedy J., Bolton D.J., 2007, The incidence of significant foodborne pathogens domestic refrigerators. *Food Control*, 18, 346-351.
7. Kennedy J., Jackson V., Blair I.S., McDowell D.A., Cowan C., Bolton D.J., 2005, Food Safety Knowledge of Consumers and the Microbiological and Temperature Status of Their Refrigerators, Food Microbiology Research Group, NICHE, The University of Ulster, Newtownabbey, Northern Ireland.
8. Kramer A., Schwebke I., Kampf G., 2006, How long do nosocomial pathogens persist on inanimate surfaces? A systematic review. *BMC Infectious Diseases*, 6, 130.
9. Li-Cohen A.E., Bruhn C.M., 2002, Safety of consumer handling of fresh produce from the time of purchase to the plate: A comprehensive consumer survey. *Journal of Food Protection*, 65(8), 1287-1296.

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