

CONSUMER ATTITUDE AND AWARENESS TOWARDS FOOD-RELATED HYGIENIC HAZARDS

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ABSTRACT

The objective of this study was to investigate awareness and attitude regarding food-related hygienic practices in the home. For this purpose and within a sanitary education program in primary schools in a town of Central Italy, a questionnaire was used to collect information from parents of pupils. The questionnaire included questions in four major areas: personal hygiene and cleaning up procedures; meal preparation; food storage; and knowledge of key terms and concepts pertaining to food safety. Analysis of 183 questionnaires showed either risk of cross contamination, improper thawing of food, or inadequate storing and reheating of cooked foods during home food preparation and storage practice. Particularly, 73% of respondents thawed large pieces of frozen food at room temperature; 89% did not reheat cooked food after it had been stored; 75% stored raw meat and poultry in the upper shelves of refrigerators. Precise information on the lack of food safety practices will facilitate the development of proper consumer education programs.

INTRODUCTION

Food can become contaminated at any stage in the food chain, from production to processing and handling prior to consumption. Therefore, the causes of foodborne diseases tend to be multiple and interdependent. However, a substantial percentage of foodborne disease outbreaks are caused by food prepared or eaten in the home (80% of outbreaks in England/Wales, 48% in Spain, etc.) (Bean and Griffin 1990; Todd 1996). Raw foods can carry microorganisms into kitchens: *Salmonellae* and *Campylobacter* are frequently found on raw meat and poultry, and vegetables are invariably contaminated by bacterial spores. These microorganisms may be spread during processing and preparation and may survive inadequate heating (Bryan 1988). Additional factors that contributed to outbreaks

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in homes are insufficient cooking, inadequate cooling and lapse of 12 or more hours between preparing and eating (Bryan 1988). Therefore, foodborne disease outbreaks can be controlled in the home through a combination of careful storage, preparation, and cooking procedures. Very little is known about the awareness, attitudes and practices of consumers on safe food handling practice and microbial hazards (Jones and Weimer 1977; Williamson *et al.* 1992; Brewer *et al.* 1994; Fein *et al.* 1995; Altekruise *et al.* 1996). In 1974 the Economic Research Service, U.S. Department of Agriculture, conducted a nationwide survey of household and reported high risk practices in 63% of 2,503 homemakers (Jones and Weimer 1977). Another survey conducted in USA reported unsafe food hygiene practices in one-third of 1,620 respondents who prepared meals (Fein *et al.* 1995; Altekruise *et al.* 1996). Therefore, it is essential to understand consumers' awareness about home food safety and home food preparation practices and, finally, to plan proper public education programs.

The aims of this study were to investigate the level of food safety awareness and attitudes, and to obtain information on the home food preparation practices of consumers. For this purpose and within a sanitary education program in primary schools in a town of Central Italy, we have selected the parents of pupils. The ultimate objective was indeed to develop an effective consumer education program.

MATERIALS AND METHODS

Questionnaires

A questionnaire was used to collect information from parents of primary schools pupils in Campobasso, Italy, investigating awareness and attitude regarding home food-related hygienic practices. The questionnaire included questions in four major areas: personal hygiene and cleaning up procedures; meal preparation; food storage; and knowledge of key terms and concepts pertaining to food safety. Answers were interpreted for classification into correct or incorrect response. A pretest was conducted during may 1995 (Sammarco *et al.* 1996) and the questionnaire was revised on the basis of the pretest findings. The final version contained 17 questions (Fig. 1).

Selection of Cluster Classrooms and Individual Children

A cluster sampling technique, involving systematic sampling from a cumulative population list, was used to select 30 cluster classrooms (World Health Organization 1991). All the primary school classrooms in the town of Campobasso served as the sampling universe. After 30 classrooms had been selected within the sampling universe, random number tables were used to select seven children in each classroom as well as a list of seven alternatives. One questionnaire was given to each of the 210 selected pupils in classrooms to be taken home. The questionnaires were completed by parents, returned, and then coded. Data were

1. Do you wash your hands before preparing food?
 yes no
2. Do you perform other domestic chores during food preparation and cooking?
 yes no
 if "yes" which domestic chores do you perform?
 dusting furniture
 washing floor
 washing toilets
 washing kitchenware
3. Do you wear rings and bracelets during meal preparation?
 yes no
4. Do you smoke during meal preparation?
 yes no
5. Do you prepare food while suffering from cold, diarrhoea, cough, and flu?
 yes no
6. Do you clean up work surfaces?
 yes no
 if "yes", you clean up work surfaces...
 only after preparing food
 both before and after cooking
 several time
7. Do you use the same kitchenware, without cleaning to prepare raw food and handle the cooked food?
 yes no
8. Do you freeze thawed food?
 yes no
9. Do you always thaw large pieces of raw frozen food?
 yes no
10. Do you thaw large pieces of frozen food at room temperature?
 yes no
11. Do you always store cooked food in refrigerators?
 yes no
12. Do you also store cooked food in ovens?
 yes no
13. Do you reheat cooked food after it had been stored in order to reach high temperature?
 yes no
14. Do you store raw meat and poultry in the upper shelves of refrigerators?
 yes no
15. What is the meaning of detergent?
 substance that kills the micro-organisms
 substance that removes dirt
 not familiar with the term
16. What is the meaning of disinfectant?
 substance that kills all the micro-organisms (harmful and innocuous)
 substance that destroy only the harmful micro-organisms
 substance that destroy harmful micro-organisms and that reduces other micro-organisms to safety levels
 not familiar with the term
17. What is the meaning of sterilization?
 procedure that kills all the micro-organisms (harmful and innocuous)
 procedure that destroy only the harmful micro-organisms
 procedure that destroy harmful micro-organisms and that reduces other micro-organisms to safety levels
 not familiar with the term

FIG. 1. SAMPLE QUESTIONNAIRE

entered into a database and were analyzed using a statistical analysis software (SPSS for windows, release 5.0) to obtain descriptive statistics.

RESULTS AND DISCUSSION

One hundred eighty-three questionnaires were completed by parents and returned, for an overall response rate of 87.1%. Of the respondents, 98.4% were female and 1.6% were male. The majority of the respondents were from the 31-40 age group (64.5%) and the 41-50 age group (25.1%). The lowest number of responses were from those under 30 (9.8%) and the 50+ group (0.5%).

The responses to the questions are shown in Table 1. In regard to the personal hygiene practices, even though behavior was somehow correct enough (98.4% of the respondents washed their hands before preparing food and 94.0% said they did not smoke during meal preparation), many consumers wore rings and bracelets (30.6%) and performed other domestic chores (50.3%) during food preparation and cooking. Among these, 14.2% dusted furniture, 12.6% washed the floor and 6.6% even washed toilets. Moreover, only 12.0% said they did not prepare food while suffering from an infectious disease (cold, diarrhea, cough, flu). Regarding the procedures of cleaning up surfaces, almost all the respondents (99.0%) said they cleaned up work surfaces at least after preparing food; moreover, 42.6% of them said they cleaned up both before and after cooking, 42.6% said they cleaned up several times, and 10.9% said they cleaned up only after cooking.

A set of questions was designed to obtain data about safe home food handling practices. Fourteen percent of respondents said they used the same kitchenware, without cleaning, to prepare raw food and handle the cooked food. This indicates that these respondents did not understand the importance of avoiding cross contamination during home food preparation practices. Regarding the freezing and thawing procedures all the respondents did not freeze thawed foods, but 73.2% of the respondents thawed large pieces of frozen foods at room temperature. The process of thawing individually frozen items is not particularly hazardous. However, if thawed foods remain at room temperature for a long time, microorganisms can multiply. Moreover, 65.6% always thawed large pieces of raw foods, whereas 30.6% seldom thawed them and 3.8% did not thaw them at all. Foods (e.g. large turkeys) that are incompletely thawed are sometimes cooked insufficiently to kill pathogens that are on or in them (Bryan 1988).

Regarding the food storage practices, 89.1% of the respondents did not reheat cooked food after it had been stored, even though this is necessary in order to reach temperatures suitable to kill vegetative cells of pathogens which could have proliferated. Because the risk increases with the span of time elapsing between cooking foods and their consumption, it is recommended that meat and poultry be kept at room temperature for as short a time as possible and certainly not longer than two hours (Williamson *et al.* 1992). Moreover, the risk of insufficient

reheating may be greater because cooked and chilled foods are frequently just warmed up rather than thoroughly heated (Bryan 1988). Leftovers containing meat or chicken must be reheated thoroughly (e.g. 65.5-80C for minutes- seconds), depending on quantity of microorganisms present and type of food, to kill vegetative forms of pathogens (Bryan 1988). Reheating in a pressure-cooker is necessary to inactivate spores. Eighty two percent of respondents correctly stored cooked foods in refrigerators. However, 5% stored them in ovens. Foods that are allowed to remain in ovens are frequently implicated as vehicles in outbreaks of foodborne disease; risks are related to the temperature of the food being held and the duration of the holding (Bryan 1988). Seventy-five percent of the respondents were unaware of the potential risks associated with storing raw meat and poultry in the upper shelves of refrigerators and were unaware that these items could cause cross contamination of food stored below.

TABLE 1.
ATTITUDE AND AWARENESS TOWARD FOOD-RELATED HYGIENIC PRACTICES

Practices	correct answer	responses of parents (n=183)					
		correct		incorrect		not respondents	
		n.	(%)	n.	(%)	n.	(%)
PERSONAL HYGIENE AND CLEANING UP PROCEDURES							
washing hands before preparing food	yes	180	(98.4)	3	(1.6)	0	(-)
performing other domestic chores during food preparation and cooking, like:	no	91	(49.7)	92	(50.3)	0	(-)
dusting furniture				26	(28.3) ²		
washing floor				23	(25.0) ²		
washing toilets				12	(13.0) ²		
washing kitchenware				74	(80.4) ²		
wearing rings and bracelets during meal preparation	no	126	(68.9)	56	(30.6)	1	(0.5)
smoking during meal preparation	no	172	(94.0)	8	(4.4)	3	(1.6)
preparing food while suffering from an infectious disease ¹	no	22	(12.0)	161	(88.0)	0	(-)
cleaning up work surfaces at least after preparing food	yes	181	(99.0)	0	(-)	2	(1.1)
FOOD PREPARATION							
using the same kitchenware, without cleaning, to prepare raw food and handle the cooked food	no	156	(85.2)	25	(13.7)	2	(1.1)
freezing thawed food	no	183	(100.0)	0	(-)	0	(-)
always thawing large pieces of raw food	yes	120	(65.6)	63	(34.4)	0	(-)
thawing large pieces of frozen foods at room temperature	no	42	(23.0)	134	(73.2)	7	(3.8)
FOOD STORAGE							
storing cooked food in refrigerators	yes	150	(82.0)	21	(11.5)	12	(6.5)
storing cooked food in ovens	no	162	(88.5)	9	(4.9)	12	(6.5)
reheating cooked food after it had been stored in order to reach temperatures suitable to kill microorganisms	yes	11	(6.0)	163	(89.1)	9	(4.9)
storing raw meat and poultry in the upper shelves of refrigerators	no	41	(22.4)	137	(74.9)	5	(2.7)

¹ cold, diarrhoea, cough, flu

² n=92

To determine consumers knowledge of key concepts, like detergent, disinfectant and sterilization, respondents were asked to correctly identify the meaning of the terms. Many consumers appear not to have a clear understanding of basic terms. Seventy-four percent of the respondents did know that a detergent is a substance that removes dirt, but 24.6% mistook it for a substance that kills microorganisms, and 1.6% was not familiar with the term. Only 43.2% of the respondents knew that disinfectant is a substance that destroys the bacteria that cause disease and that reduces other microorganisms to safe levels; 43.7% incorrectly answered that disinfection was associated with destruction of all the microorganisms; 11.5% knew that disinfectant is a substance that kills only the harmful microorganisms; and 1.6% was not familiar with the term. Seventy-eight percent of the respondents knew that sterilization was associated with total destruction of microorganisms; however 15.8% thought it was associated with the destruction of bacteria that cause disease and with reduction of other microorganisms to safety levels, and 3.8% though it was associated only with destruction of harmful microorganisms; 2.2% was not familiar with the term.

Lifestyle behaviors and the acceptability of consumer product depend on perceptions of risk related to lifestyle (e.g. risk originated from fat or alcohol consumption), microbiological (e.g. risk originated from bacteriological contamination) or technological (e.g. risk originated from genetic manipulation of both animals and plants) hazards (Frewer *et al.* 1994). Low personal perception of risk related to food safety issues would imply that consumers ignore the potential risk from microbiological hazard and apply improper measures during home food preparation and storage practices, either improper thawing of food, or cross contamination, or inadequate storing and reheating of cooked foods. Moreover, an essential knowledge of food pathogens microbiology may motivate consumers to use safe food storage, preparation and cooking procedures (Altekruse *et al.* 1996).

In developed countries, improved standard of living have led to a rise in consumption of food of animal origin, and the incidence of salmonellosis and *Campylobacter* enteritis, which are principally spread by foods of animal origin, have increased during the past decades (Doyle 1993; WHO 1995; Todd 1996). The principal problem is the improper handling of foods by both consumers and foodservice workers (Doyle 1993). Particularly, important factors that contributed to outbreaks of foodborne diseases in homes are contaminated raw foods, cross contamination, lapse of more than 12 h between preparing and eating, insufficient reheating and improper hot holding (Bryan 1988). However, consumers are less likely to participate in formal education programs than foodservice workers. Therefore, innovative approaches to educating consumers about food preparation techniques are needed. The data gathered from this study have provided some information on consumer food safety awareness and hygienic food preparation practices. This will facilitate the development of education programs concentrating on the lack of awareness emerging from the survey. Programs should feature the

following topics: practical information on microbiology of foodborne disease, personal hygiene, suitable clean up procedures, proper home food preparation, prevention of cross-contamination, and food storage practices.

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