

Perceptions of Hygiene among Staff Working in Food Companies

¹Nevin Sanlier and ²Fatih Turkmen

¹Faculty of Health Sciences, Gazi University, Besevler, Ankara, Turkey

²Gaziosmanpasa University Zile, Tokat, Turkey

Abstract: Foods prepared without following hygiene rules result primarily in food poisoning and many other diseases that have negative effects on human health. The present study was designed and conducted to detect hygiene perception of the staff employed in the food companies operating in Ankara, the capital city of Turkey. Educational level was found to be significantly correlated to food hygiene perception scores ($r = 0.159$, $p < 0.05$), personnel hygiene perception scores ($r = 0.032$, $p < 0.05$) and kitchen equipment hygiene perception scores ($r = 0.093$, $p < 0.05$). In addition, cooks were observed to get higher hygiene perception scores when compared to the other occupational groups included in the present study (142.90 ± 13.98). The lowest hygiene perception scores were taken by the cleaning staff ($p < 0.05$).

Key words: Catering, cook, service staff, cleaning staff, dishwashers, food hygiene awareness, food hygiene perception

INTRODUCTION

Hygiene has gained considerable importance in each step of the food chain from production to preparation and serving of the food since nutritional habits have changed and out of house food consumption has increased due to the living and working conditions of today's world. Each year, 9.4 million people suffer from food-borne diseases throughout the world. Every day, cases related to food borne diseases are recorded in all countries from the most to the least developed ones. As most of these cases are not reported, actual scale of the problem is not known clearly (Hudson and Hartwell, 2002; Veiros *et al.*, 2009). Different reports prepared on the cases of food borne diseases recorded in a specific year suggested approximately 325 hospitalizations and 5 deaths related to food-borne sources (Mead *et al.*, 2006). In another study 60.854 hospitalizations and over 1.800 deaths were estimated to be caused by food borne diseases (Bryan, 2002). Food-borne diseases have been associated with improper storage or reheating of food and cross-contamination (Egan, 2007).

Food handlers have a major role in the prevention of food poisoning during food production and distribution phases. Food handlers may cause food borne diseases by cross-contaminating the raw and processed foodstuffs as well as cooking and storing food under inappropriate conditions and using contaminated equipment. They can be asymptomatic carriers of food poisoning organisms (Cruikshank, 1990; Bruhn and Schutz, 1999; Walker *et al.*,

2003; Sanlier, 2009). Therefore, food safety is a major concern of the food industry and a key public health issue at international, national and local levels (Tahkapaa *et al.*, 2009).

Regarding the food-borne diseases recorded in catering firms 97% of such cases are associated with inappropriate practices adopted in the food preparation process. For instance, traces of the foods served by catering firms were found in nearly 22% of the food borne diseases in England, in 45% of the food borne diseases in the USA and in 50% of the food-borne diseases in Ireland (Bolton *et al.*, 2008). Food borne diseases result from factors such as staff with unclean hands; low-level hygiene knowledge; wrong temperature applications; storage temperature of cold-stored foods and low level knowledge of acceptable freezer temperatures, food pathogens and similar issues (Coleman and Roberts, 2005; Askarian *et al.*, 2004). Moreover, poor information on hand hygiene is also known to result in food borne diseases for instance, when staff prepare salad without washing his/her hands after going to the toilet or after touching raw meat (Bas *et al.*, 2006; Cakyroglu and Ucar, 2008; Sudershan *et al.*, 2008).

As a result inappropriate working conditions, low-level personnel hygiene and improper equipment used by food handlers may cause food poisoning (Cakyroglu and Ucar, 2008). Staff should pay attention to the surfaces of utensils used in food and beverage preparation, cook and service fields and to the cleanliness of their hands, body and clothing in order to prevent the

transmission of pathogens to food (Sneed *et al.*, 2004). According to the data produced by WHO (1989) data, food handling personnel play an important role in ensuring food safety throughout the food production, processing, storage and preparation chain. Some of the worst habits adopted by the staff working in the food and beverage sector can be listed as touching prepared food with fingers, playing with his/her nose, scratching the head and acne, tasting foods with unwashed and dirty spoons not washing hands after touching his/her nose and mouth, using food preparation sinks for washing hands and touching the inside of plates and glasses with his/her hands (Bas and Merdol, 2002). In Australia, food handlers were reported to apply poor working techniques and to pay only casual attention to cleanness (Jay *et al.*, 1999). May studies also showed that participants did not wash knives after using them and that they re-used cutting boards without washing them after using for cutting raw meat (Jay *et al.*, 1999; Jevsnik *et al.*, 2008). Byrd-Bredbenner *et al.* (2007) found that study participants did not wash their hands with soap and water after touching raw poultry and that 97% of the participants had low-level knowledge of food safety. If food handlers develop an appropriate hygiene perception it will be possible to make improvements in the field of food hygiene and thereby to reduce the risk of food-borne diseases (Clayton *et al.*, 2002). A number of studies indicated that although training may bring about an increased knowledge of food safety it does not always result in a positive change in food handling behavior (Howes *et al.*, 1996; Cakiroglu and Ucar, 2008).

Despite the importance of this issue, unfortunately there is no legal obligation or compulsory training program in Turkey to improve awareness on food safety and appropriate preparation techniques and to ensure that this knowledge is put into practice. Therefore, this study was conducted to determine the perceptions and awareness on food preparation techniques of the staff working in food beverage preparation, cooking and service departments of catering firms in Turkey.

MATERIALS AND METHODS

Sampling plan: In recent years, various organizations and institutions in Turkey have started to employ catering firms to provide meals for their personnel. Catering firms provide direct employment for 350 people and indirect employment opportunities for 1.5 million people (Arslan, 2005). There are nearly 6,000 catering firms in Turkey (Mordeniz, 2002). However, there are only 571 catering firms, table d'hote and ready to serve food enterprises granted work permit and food registry certification.

Unfortunately remaining ones make off-the-record production. No monitoring takes place of the production processes of these firms and enterprises. There are <4 firms and enterprises which are not monitored which are not required to comply with any formal legislation and which produce food by violating the hygiene conditions required for food production.

It is of utmost importance to regulate these firms and enterprises and to apply control and supervision mechanisms to the whole food chain from the initial phase of production to the last phase of consumption-so as to provide safe food to consumers. The present study was conducted in October 2008-March 2009 period. The study universe was composed of 30 registered firms operating in Ankara Province and of 1500 staff employed in these firms. Due to high cost of sampling and time limitations, study sampling was calculated using the following formula (Ryan, 1995):

$$n = \frac{NPq}{(N-1)B^2 + Pq/Z^2}$$

$$n = \frac{1500(0.5)(0.5)}{(1500-1)(0.05)^2 + (0.05)(0.05)/(1.96)^2}$$

Where:

- n = 360
- n = Number of samplings
- N = The group subject to the study
- P = Group ratio or estimate (p = 0.5)
- q = 1-P (q = 0.5)
- B = Acceptable error ratio (B = 0.05)
- Z = Demanded confidence interval (Z = 1.96)

Face to face interviews could not be conducted with the staff due to hygiene rules and their heavy work schedule. Therefore, the sample size was set at 360 persons. However, only the 259 of 360 questionnaires sent to the staff were completed and returned (return rate = 72%). Incomplete questionnaires were eliminated, giving a final sample size of 237 respondents.

Instrumentation: The questionnaire was pilot tested by 30 participants during October 2008 to confirm the clarity of questions, identify response options and determine the likely interview duration. The revised questionnaire was divided into four sections:

- Demographic section
- Perception of kitchen equipment hygiene (10 questions)
- Perception of food hygiene (14 questions)
- Perception of personal hygiene (13 questions)

In order to determine hygiene perceptions, a 37 item questionnaire based on a Likert type scale was used. The validity and reliability of the scale (Cronbach Alpha = 0.830) was established previously by Buruk and Sahin. The scale includes a set of negative sentences Appendix, statements 3, 4, 15, 17, 23, 27, 28, 32, 34 and 36) in addition to positive statements. Responses to positive sentences are scored as follows 5 points for I certainly agree; 4 points for I agree; 3 points for undecided; 2 points for I don't agree and 1 point for I certainly don't agree. In the negative sentences, the scores are assigned in the reverse order. Scores of the kitchen equipment hygiene section ranged from 10-50 points; the scores of the personal hygiene section ranged from 13-65 points. Thus, total questionnaire scores ranged from 37-185 points.

Data analysis: Questionnaire responses were analyzed using SPSS software (version 11.5). An Independent Samples t-test was used for the gender variable and One Way ANOVA was used for the other hygiene perception variables. Frequencies, mean values and standard deviations were also calculated. Statistical significance was set at $p < 0.05$. The results are shown in tabular form.

RESULTS AND DISCUSSION

Participant characteristics: Demographic information of staff working in the catering industry is shown in Table 1. About 63.3% of the participants were male and 36.7% were female. 28.3% of participants graduated from primary school and 62.4% from high school. All participants were within the 18-60 age range ($X = 28.9$ years). About 26.2% of participants were cook, 62.8% were service staff and 11.0% were cleaning staff and dishwasher. About 23.2% had been working in the same catering firm for 6 years or longer, 50.6% for 1-5 years and 26.2% for >1 year when the study was conducted.

Most of the participants ($n = 221$) prepared or served food to >1000 customers. All the staff stated that they were subject to germ carrier testing, 96.2% of the staff stated that they were subject to lung X-rays, 64.6% that they were subject to urine analysis, 91.1% that they were subject to stools analysis, 81.0% that they were subject to mucus analysis, 60.0% that they were subject to blood analysis at specific intervals due to legal requirements. Gender-based hygiene perceptions of the participants are shown in Table 2.

Gender based analysis shows that women participants scored significantly lower than male participants in perception of food hygiene (47.66 ± 6.05) and kitchen equipment hygiene (36.57 ± 4.81) (scores of male participants were 49.38 ± 6.08 and 38.20 ± 5.57 ,

Table 1: Demographic information of catering staff

Demographic information (n = 237)	n	Percentage
Gender		
Male	150	63.3
Female	87	36.7
Educational status		
Primary school graduate	67	28.3
High school graduate	148	62.4
College graduate	22	9.3
Work experience (years)		
<1	62	26.2
1-5	120	50.6
6+	55	23.2
Occupation		
Cook	62	26.2
Service staff	149	62.8
Cleaning staff, dishwashers	26	11.0

Table 2: Gender based distribution of catering staff

Hygiene perception	Male	Female	t-test	p-value
Food hygiene	49.38 ± 6.08	47.66 ± 6.05	2.094	0.037
Personnel hygiene	51.01 ± 6.21	50.77 ± 5.82	0.297	0.767
Kitchen equipment hygiene	38.20 ± 5.57	36.57 ± 4.81	2.280	0.024
Total score	138.60 ± 15.07	135.01 ± 13.61	1.829	0.069

$p < 0.05$

respectively) ($p < 0.05$). Analysis of the hygiene perceptions of participants on the basis of educational status showed no statistically significant difference ($p > 0.05$).

The difference between the hygiene perceptions of the participants on the basis of work experience was not found to be statistically significant (Table 3).

Assessment of the hygiene perceptions of the participants on the basis of occupational groups showed that cooks had higher hygiene perceptions compared to the other occupation groups (142.90 ± 13.98). The difference was found to be statistically significant for all categories. The lowest score was taken by the cleaning staff with a statistically significant difference ($p < 0.05$) (Table 4).

An important correlation was detected between the food hygiene perceptions ($r = 0.159$, $p < 0.05$), personal hygiene perceptions ($r = 0.032$, $p < 0.05$) and kitchen equipment hygiene perceptions ($r = 0.093$, $p < 0.05$) of the respondents on the basis of educational status.

Food-poisoning is a gradually increasing problem for all countries in the world. According to the Turkish Statistics Institute, 26,772 people were hospitalized with food poisoning complaints in Turkey in 2000-2002 period and 509 of these 26,772 people lost their lives (Eren, 2007). Therefore, special attention should be paid to hygiene in mass food consumption systems. The most common hygiene mistakes made by the staff working in food and beverage firms are the ones made during preparation,

Table 3: Hygiene perceptions of catering staff on the basis of educational status

Hygiene perception	<1($\bar{X} \pm SD$)	1-5($\bar{X} \pm SD$)	6+($\bar{X} \pm SD$)	F	p-value
Food hygiene	49.16±5.660	49.15±6.310	47.41±6.090	1.711	0.183
Personnel hygiene	51.22±6.190	50.41±6.270	51.69±5.420	0.935	0.394
Kitchen equipment hygiene	36.96±4.360	37.71±5.810	38.09±5.350	0.689	0.503
Total score	137.35±13.45	137.28±15.57	137.20±14.00	0.002	0.998

Table 4: Hygiene perceptions of catering staff based on work experience

Hygiene perception	Cook ($\bar{X} \pm SD$)	Service staff ($\bar{X} \pm SD$)	Cleaning staff, Dishwashers ($\bar{X} \pm SD$)	F	p-value
Food hygiene	50.38±5.830	48.28±6.270	47.50±5.200	3.249	0.041
Personnel hygiene	52.58±6.230	50.75±6.100	47.92±3.930	5.773	0.004
Kitchen equipment hygiene	39.93±4.820	36.58±5.210	37.92±5.800	9.214	0.000
Total score	141.42.90±13.98	135.63±14.77	133.34±11.83	6.785	0.001

p<0.05

cooking, cooling and re-heating phases, cross-contamination mistakes, personal hygiene mistakes, mistakes made during preparation of the food and mistakes related to post cooking internal temperature controls and to time-temperature procedures (Oteri and Ekanem, 1992; Walker *et al.*, 2003).

In addition, employment of people with low educational and socio-economic backgrounds in food related works, low staff-motivation and low wages also result in the failure of staff to pay required attention to food safety (Walker *et al.*, 2003). A study on the hygiene perception in Finland showed that the most significant hygiene gap in the finnish food sector was the design of equipment which underlined that more attention should be paid to both staff awareness and equipment (Aarnisalo *et al.*, 2006).

According to Ajzen (1991), the best predictor of a person's behavior in any given situation is his or her behavioral intention. A person's behavioral intention is based upon three antecedents his or her attitudes, subjective norms and perceived behavioral control over performance of the behavior. It will only be possible to achieve full food safety when the necessary food safety knowledge is transformed into appropriate actions. Results of behaviors are transformed into decisions and decisions subsequently turn into actions. Therefore, food safety knowledge should be turned into behaviors and attitudes. It will not be possible to benefit from the knowledge if obtained in artificial environments-under real and complex conditions. The food safety behaviors developed by any food and beverage handler are effective on the attitude the person develops as a result of such behavior.

Studies emphasize that personnel training is of great importance for the implementation of HACCP in food enterprises (Bas *et al.*, 2007; Walker *et al.*, 2003). When compared to the maximum score the scores obtained by the respondents in the present study can be deemed low, suggesting that catering sector staff require training on

Table 5: Correlation of hygiene perception scores on the basis of age, education and work experience (r)

Hygiene dimensions	Age	Education	Work experience
Food hygiene	0.048	0.159	0.097
Personnel hygiene	0.057	0.032	0.023
Kitchen equipment hygiene	0.132	0.093	0.074
Total score	0.045	0.114	0.004

p<0.05

food safety. However, as long as the behavior and attitude to be developed at the end of such training do not complement each other the relationship between the two can not be a strong one (Ajzen and Fishbein, 1977). Dag and Merdol (1999) stated that hygiene training considerably increased the hygiene knowledge of the kitchen staff included in their study. Another study found that staff developed positive attitudes towards food safety but that they made mistakes in the working environment (Angelillo *et al.*, 2001).

In the present study, a statistically significant correlation was found between the food and personnel hygiene perceptions of the respondents and educational status (Table 5). A study carried out by Unusan (2007) showed that food safety attitudes and knowledge of a person differ significantly on the basis of his/her educational background. The finding of may have resulted from the fact that staff preparing food beverage is tend to be more sensitive on this issue. Another study revealed that hygiene knowledge amongst kitchen staff changes according to educational status but hygiene training eliminates these differences (Dag and Merdol, 1999). A study by Ansari-Lari *et al.* (2009) found a significant relationship between the educational status, general knowledge, knowledge and practices about microbiological food hazard of food handlers and the study period. Angelillo *et al.* (2001) reported that knowledge on food borne pathogens was significantly increased among workers with a higher educational level. These results support the results obtained in the present study (Table 5). In another study, an increase was

recorded in the scores of the respondents as the study period increased (Sanlier, 2009). The present study also showed that participants with greater experience in the catering sector attached more importance to personal hygiene and kitchen equipment hygiene (Table 3). The analysis of occupational groups revealed that cooks had greater knowledge of hygiene than both service and cleaning staff. This result shows that not only cooks but also other staff should be trained on food safety (Table 4).

After all, all food service and food handling personnel should be aware that a high standard of personal hygiene such as effective hand washing and use of gloves is of paramount importance in terms of preventing food contamination and further in preventing the spread of infectious diseases (Angelillo *et al.*, 2001).

The unsafe handling of food by restaurant employees does not result solely from a lack of knowledge on food safety. Howes *et al.* (1996) reported that even when restaurant employees were properly trained in food handling, they might not put this knowledge into practice. Some researchers on the other hand stated that improvements were recorded after food safety training (Cohen *et al.*, 2001; McElroy and Cutter, 2004). Managers as well as the food production staff should pay the necessary attention to this issue. In a previous study, managers also indicated that they would be more likely to institute food safety policies if they had more time, money and employee interest (Roberts and Sneed, 2003). Establishment of an in-kitchen structure complying with food safety and achievement of behavioral change is only possible via training and managerial support (Griffith, 2000). However, not only food handlers or managers but also suppliers should comply with legal regulations and food safety.

CONCLUSION

In conclusion, both organizations and relevant staff should adopt appropriate behaviors and should implement the necessary procedures. They should do this not just because of legal obligations but out of respect for human life. Steps to achieve these objectives should be appropriate, decisive and should result in permanent behavioral changes. In the pursuit of excellence in food safety issues, visionary managers and capable food handlers (who can effectively implement the system) should be provided training and personal development opportunities to fully undertake the assigned duties. Evaluation of program effects is necessary in order to assess its benefits and to identify potential areas for change and improvement. However, training may need to be supported by subsequent checks to ensure that

increased awareness is turned into behavioral changes. If appropriate checks and controls are not put in place after the training, different mistakes may result in increased risks. This may cause an irrevocable loss of reputation and prestige for the company (CIA, 2002). Managers and staff should co-operate on such factors to prevent loss of prestige and health inspectors should fulfill their duties on time and in a professional manner. This is of great importance for both public health and also successful promotion of the enterprise. Furthermore, issues such as food-hygiene have wider implications for developing countries in terms of global perceptions and attracting investment and tourism successfully.

The primary consideration of a food safety training program should be to determine the training needs of employees, a training program should be developed to provide the necessary training and seminars to all staff at every level within the organization. Vocational training programs should be reviewed in the scope of a government policy in order to address the low awareness amongst qualified employees within the food and catering sector such as chefs and service employees and the number of schools providing training on such occupations should be increased.

LIMITATIONS

Although, the questionnaire produced a high reliability coefficient, it is acknowledged that self reported studies may be subject to response bias. Since the enterprises did not permit face to face interviews due to hygienic regulations, respondents may have been influenced by each other's responses. Therefore, it may not be appropriate to generalize these data. Further studies should be conducted with the participation of larger participant groups.

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APPENDIX

- 1 Food hygiene refers to purification from the elements that cause disease
- 2 Each staff is a bacteria host who can spread it
- 3 There is no objection to the fact that food and kitchen waste can be kept together in the kitchen
- 4 Staff responsible for food service can touch food with their bare hands

- 5 Uncooked and cooked foods should be prepared on separate counters
- 6 Bacteria are spread mostly through respiration
- 7 A food poisoning outbreak damages the image of a hotel
- 8 Hand is the body part on which most microorganisms can be found
- 9 Bacteria can spread through open wounds and digestive system
- 10 Staff should get a check-up every six months
- 11 Hot meals should be kept at 60°C or higher temperatures until they are served
- 12 There is objection to the fact that employees can enter into the kitchen in shoes or clothes they wear outside
- 13 Employees should wear clean and ironed caps or bonnets
- 14 The inside of cold stores and refrigerators should be clean and well-maintained
- 15 There is no objection to the fact that sunlight can enter into the store or pantry
- 16 Grounds of the food production fields and service areas should be well-cared and kept dried
- 17 There is no objection to the fact that products containing milk and egg and meat products can be stored at high temperatures
- 18 When purchasing meat, one should pay attention to its label
- 19 One should not put his or her hands into water glasses
- 20 There should be enough showers and bathroom facilities for staff
- 21 In case of cold, flu, diarrhea etc., staff should not work or they should work in background service
- 22 Clean and healthy water, analyzed in a laboratory should be used in the kitchen
- 23 There is no objection to the fact that one can hold forks and knives from their top parts
- 24 Washing hands hygienically means washing them with hot water and soap and rubbing them up to the wrists and brushing under the nails
- 25 Staff should pay attention to hygiene while entering and exiting the working area
- 26 The surfaces where food is prepared should be cleaned after food is removed
- 27 There is no objection to the fact that staff can smoke
- 28 The used cleaning clothes do not always need to be washed and dried
- 29 Hot food should be stored and cooled in small and shallow containers
- 30 While washing dishes, one should be fastidious when washing, rinsing and sterilizing the dishes
- 31 Kitchen waste should be eliminated from the kitchen by grinding or placing in the waste containers

- 32 There is no objection to the fact that cooked food may be kept for two hours prior to serving
- 33 Wounds on the hands should be covered by waterproof bandages
- 34 All equipment should be dried up in the open air after washing, rinsing and sanitation
- 35 Food can be refrozen after thawing
- 36 Food should be tasted using a spoon different from the one used for stirring it
- 37 Frozen food should be thawed in a warm environment (in the kitchen, on a radiator etc.)

Note: Variables numbered 1, 3, 4, 5, 7, 11, 17, 18, 22, 29, 32, 35, 36 and 37 relate to food hygiene; variables numbered 2, 6, 8, 9, 10, 12, 13, 20, 21, 24, 25, 27 and 33 relate to personnel hygiene and variables numbered 14, 15, 16, 19, 23, 26, 28, 30, 31 and 34 relate to kitchen and equipment hygiene.

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