

Literature on evaluating food handler training programs:

Studies of training programs

- ServSafe programs
 - York et al., 2009: <http://www.ncbi.nlm.nih.gov/pubmed/19699837>
 - **Abstract:** The number of foodborne illnesses traced to improper food handling in restaurants indicates a need for research to improve food safety in these establishments. Therefore, this 2-year longitudinal study investigated the effectiveness of traditional ServSafe (National Restaurant Association Educational Foundation, Chicago, IL) food-safety training and a Theory of Planned Behavior intervention program targeting employees' perceived barriers and attitudes toward important food-safety behaviors. The effectiveness of the training and intervention was measured by knowledge scores and observed behavioral compliance rates related to food-safety practices. Employees were observed for handwashing, thermometer usage, and proper handling of work surfaces at baseline, after receiving ServSafe training, and again after exposure to the intervention targeting barriers and negative attitudes about food-safety practices. Repeated-measures analyses of variance indicated training improved handwashing knowledge, but the intervention was necessary to improve overall behavioral compliance and handwashing compliance. Results suggest that registered dietitians; dietetic technicians, registered; and foodservice managers should implement a combination of training and intervention to improve knowledge and compliance with food-safety behaviors, rather than relying on training alone. Challenges encountered while conducting this research are discussed, and recommendations are provided for researchers interested in conducting this type of research in the future.
 - Roberts et al., 2008: <https://krex.k-state.edu/dspace/bitstream/handle/2097/806/RobertsFPTApr2008.pdf;jsessionid=EBCE1BAFFD47F3A77D6DE777F3D36203?sequence=1>
 - **Abstract:** Statistics show that 59% of foodborne illnesses are traced to restaurant operations. Food safety training has been identified as a way to assure public health, yet evidence supporting the effectiveness of training has been inconclusive. A systematic random sample of 31 restaurants in three midwestern states was selected to assess the effect of training on food safety knowledge and behavior. A total of 402 employees (242 pretraining and 160 post-training)

participated in this study. Pre and post-training assessments were conducted on knowledge and behavior related to three key food safety practices: cross contamination, poor personal hygiene, and time/temperature abuse. Overall knowledge ($P \geq .05$) and compliance with standards of behavior ($P \geq .001$) improved significantly between pre- and post-training. When each practice was examined independently, only handwashing knowledge ($P \geq .001$) and behavior ($P \geq .001$) significantly improved. Results indicated that training can improve knowledge and behaviors, but knowledge alone does not always improve behaviors.

- Non-ServSafe or multi-program studies
 - Ehiri, Morris, and McEwen, 1997:
<http://www.sciencedirect.com/science/article/pii/S0956713597000054>
 - Abstract: This paper reports the findings of a study which investigated the effectiveness of a food hygiene training course in Scotland, and discusses the implications these may have for food safety control in the UK and elsewhere. One hundred and eighty-eight individuals who undertook the elementary food hygiene training course of the Royal Environmental Health Institute of Scotland (REHIS), and a comparison group comprising two hundred and four employees of a City Council were surveyed by means of a structured self-completion questionnaire. Food hygiene knowledge, attitudes and opinions of the course participants were assessed before and after training, and compared with those of the comparison group. The training course evaluated by the study is typical of many certificated training courses applied in the food industry. After training, no significant improvements were observed in course participants' pre-course knowledge of a number of crucial aspects of food safety, including food storage, cross contamination, temperature control, and high risk foods. The findings highlight problems likely to arise from reliance on training designs which primarily emphasise the provision of information that seldom translates into positive attitudes and behaviours. This suggests a need for the adoption of approaches which take account of social and environmental influences on food safety, thus, ensuring that food hygiene training is seen, not as an isolated domain which sole purpose is to produce certificated personnel, but as part of an overall infrastructure for effective food safety control.
- Online programs
 - Croker and Liu, 2006 (dissertation):
<http://dl.acm.org/citation.cfm?id=1168405>

- Abstract: The purpose of the study was to identify preferences among foodservice employees for traditional classroom or computer-based training (CBT) based upon age, gender, and educational level; examine how employee preferences toward traditional classroom training or CBT differ in two franchise restaurant types, fast food restaurants and full service restaurants; explore learning preferences among foodservice employees toward using traditional classroom training or CBT; and analyze the possible relationships between age, gender, educational level, type of restaurant, and learning style in the attitudes toward CBT among foodservice employees in Southeastern Idaho. A self-reporting inventory was designed to collect data. Results of this study showed that older employees were less comfortable with CBT than younger employees, females were less comfortable with CBT than males, and employees in full service restaurants were also less comfortable than those in fast food restaurants. Employees with a diverger learning style more often preferred traditional classroom training than CBT. As to the attitudes among foodservice employees toward CBT, the results revealed that female and older employees, employees with lower education levels, employees in full service restaurants and employees with a diverger or an assimilator learning style had more negative attitudes toward CBT in terms of format, presentation, confidence, learning motivation, and usefulness of CBT. These findings might contribute to a better understanding of employee preferences for different training methods, employee attitudes toward CBT and examine CBT usage and programs.
- Hislop and Keara, 2009 (food safety knowledge retention):
<http://www.ingentaconnect.com/content/iafp/jfp/2009/00000072/00000002/art00030>
 - Abstract: Foodborne illness in Canada is an ongoing burden for public health and the economy. Many foodborne illnesses result from improper food handling practices. If food handlers had a greater knowledge of what causes foodborne illness, perhaps these illnesses would have less of an impact on society. This study gave researchers the opportunity to examine the current food safety knowledge of food handlers by using a standardized questionnaire. Questionnaires were distributed by environmental health officers to food handlers working in the food service industry during on-site inspections, and responses were used to evaluate immediate knowledge of key food safety issues. Both certified and noncertified food handlers were evaluated. Information also was collected on the number of years since food safety

certification was achieved and the number of years experience noncertified food handlers had in the food service industry. Results indicated that certified food handlers had a greater knowledge of food safety information than did noncertified food handlers. The highest failure rates were observed among noncertified food handlers with more than 10 years of experience and less than 1 year of experience. The results support the need for mandatory food safety certification for workers in the food service industry and for recertification at least every 10 years. Although the study was not sufficiently rigorous to evaluate existing food safety courses, data collected provided valuable insight into what issues should be emphasized in existing food safety courses and which should be targeted by future food safety initiatives.

- Worsfold, Griffith, and Worsfold, 2004 (Enviro Health officer's views on food hygiene training effectiveness):
<http://www.emeraldinsight.com/doi/full/10.1108/00070700410515208>
 - Abstract: In both their enforcement and training role environmental health officers (EHOs) may influence businesses' attitudes to hygiene training. A survey was conducted to examine EHOs' experience and perceptions of the provision and effectiveness of food hygiene training in small food businesses. The results indicate that officers had concerns about the content and the delivery of hygiene courses and about the quality of other hygiene trainers. Officers use the industry guides to advise on training but receive limited guidance on the assessment of hygiene training in the workplace. The checking of training records was considered to be less important than the use of observation and questioning for assessing hygiene training effectiveness. Environmental factors, such as supervisor support and situational aids were judged by officers to be important factors in the implementation of workplace hygiene training. They reported low levels of formal refresher training and active support of training by management.
 - See Methods section for survey details
- **Medeiros et al. 2011 (Food Control, Volume 22, Issue 8, August 2011, Pages 1136-1144) Assessment of the methodological strategies adopted by food safety training programmes for food service workers: A systematic review**
<http://www.sciencedirect.com/science/article/pii/S0956713511000569>
- Abstract: This is a systematic review conducted to identify and assess the methodological strategies used in training programmes designed to enhance food safety in food services. Fourteen original articles

were selected from the Scopus, Scielo and Medline digital databases. The topics most dealt with in the educational programmes were personal hygiene, food safety and best practices. The resources most widely used during the training courses were interactive media, audiovisual materials, videos, lectures and recreational activities. In addition to being low cost, hand washing activities yield positive results in food safety. Employee training assessment is carried out by using questionnaires, analytical monitoring, a check list and the Likert scale. Hand washing is the most assessed item. The activities most widely accepted by the employees during training courses are interactive media and hands-on activities. These activities contribute toward the enhancement of employees' skills and knowledge, and encourage changes in attitude and behaviour.

Studies on evaluation

- Ko, 2010:
<http://www.sciencedirect.com/science/article/pii/S0956713509002199>
 - Abstract: This study investigates food safety perceptions and agricultural food handling practices, as well as satisfaction with the work performance of such handlers. Data are collected from 333 food handlers at agricultural food processing companies or restaurants. Data is analyzed by SPSS, with statistical analyses including descriptive statistics, *t* tests and regression analyses. **Dimensions pertaining to food safety perception and practices include personal sanitation, pre-handling food preparation, food preparation and after food preparation.** The scales of food safety perception during analysis are higher than what are typically found in practice, and some gaps are identified. Analysis results indicate that food preparation and after food preparation dimensions have significantly higher mean values than those associated with pre-food handling and personal sanitation. Regression analysis further demonstrates that satisfaction with work performance can accurately predict food safety perception and practice components. Moreover, their handling practices mediate how perception affects satisfaction with work performance of food handlers.
- Medeiros et al., 2001:
<http://www.sciencedirect.com/science/article/pii/S1499404606600675>
 - Abstract: Traditionally, nutrition educators have used a fairly global approach to teach food safety by teaching a broad range of safe food handling behaviors in the expectation that this will lead to the avoidance of foodborne illness. This approach can be confusing and lead to evaluation data that are difficult to interpret. This article suggests that food safety education and evaluation in the future be organized around five behavioral constructs: practice personal

hygiene, cook foods adequately, avoid cross-contamination, keep foods at safe temperatures, and avoid food from unsafe sources. These five constructs are derived from data on actual outbreaks and estimated incidences of foodborne illness. **Research is needed to establish reliable and valid evaluation measures for these five behavioral constructs. Evaluation instruments can be tailored to fit specific education programs. If evaluation instruments focus on these five behavior areas, the result will be meaningful evaluation data that can be more easily summarized across food safety education programs for consumers.**

- Deniston, Rosenstock, and Getting, 1968:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1891042/>
 - Old study on evaluating the effectiveness of public health programs