

# Cabin Crew Food Safety Training: A Qualitative Study

Ayman Abdelhakim, Eleri Jones, Elizabeth Redmond, Mahmoud Hewedi, Phillip Seaman

## Abstract

This study aims to explore the status of cabin crew food safety training in different airlines. Using the snowballing technique, 26 cabin crew managers, supervisors and trainers (from 20 international airlines) participated in in-depth, structured interviews. The interview schedule was developed to determine and evaluate implementation and perceptions of cabin crew training. Data was analysed using a qualitative content analysis approach. All respondents perceived cabin crew food safety/hygiene issues are important in relation to on-board food-handling, for example: "food safety is always an important issue". Findings indicated that while most of the airlines (90%) train cabin crew on food safety, different cabin crew roles perceived the same level of food safety training. The results obtained can be used to inform development of future training programmes, methods and evaluation.

**Keywords:** Cabin crew - food safety - training- airlines – qualitative

## 1. Introduction

Airlines are obliged to carry cabin crew on aircrafts to meet the minimum requirements of the Civil Aviation Authority (Cabincrew, 2010). Some airlines therefore hire thousands of cabin crew, for instance, the number of Emirates' cabin crew was over 17,000 in February 2014, hired from over 130 countries and collectively speaking more than 50 languages (Emirates Group, 2015). Cabin crew responsibilities not only include ensuring the safety of the aircraft and its passengers, but extend to food handling which includes the safe receipt, storage, reheating and serving of meals on board and thus challenges regarding safe and standardised airline food service are present (IFSA, 2015).

On-board, cabin crew handle high-risk foods, including salads, meat and fish, served hot or cold pre-prepared and plated cold meat and fish, canapés and special meals. These food handling-related duties, unless carefully and critically practiced, may lead to microbiological, chemical, physical and allergic hazards (McMullan et al., 2007; Abdelhakim, 2016; IFSA, 2015). Specifically, it has been reported that cabin crew mishandling of food has resulted in eight out of twelve reported food poisoning outbreaks due to malpractices and unhygienic behaviours. Examples of such reported malpractices include consumption of passengers' meals instead of eating their foods provided specifically for them to avoid any risk of food contamination (Hatakka, 2000), and were incapable to handle some in-flight allergic reactions (Greenhawt et al., 2013).

39 Considering that it is well established that food safety training/education can be an  
40 effective strategy for improving knowledge and attitudes of food safety and may  
41 reduce the risk of food poisoning/ foodborne illness incidence (Zanin et al., 2017;  
42 Young et al., 2017) among consumers at the home (Young, et al., 2015; Young, and  
43 Waddell, 2016; Young et al., 2017; Evans and Redmond, 2014) and in different  
44 catering sectors (Seaman and Eves,2010) and retailing industry (Thaivalappil et al,  
45 2018).

46  
47 However, while a plethora of studies have been conducted on food safety training  
48 issues in different sectors of the catering industry (Radu et al., 2014; Jones, 2007),  
49 this is not the case with flight catering (Yavari et al., 2015) and in particular cabin  
50 crew (Eves and Dervisi, 2004, Sheward, 2006; Abdelhakim, 2016; abdelhakim et  
51 al, 2018). The absence of generic cabin crew food safety training is argued by  
52 Sheward who had a personal and practical experience in this matter. Sheward  
53 (2006:203) asserted that *“the need for hygiene training is not acknowledged and fully  
54 understood by either the commercial or corporate aviation sectors”*. Although there  
55 is no mandatory aviation requirement to train crew on food safety issues, there is a  
56 legislative compliance in many countries including European countries such as UK.

57  
58 Subsequently, various airlines, including British Airways, reportedly train cabin crew  
59 on food safety and galley hygiene (Eves and Dervisi, 2004; Abdelhakim, 2012).  
60 Despite this, Sheward (2001:2) claimed that *“A few of the airlines I challenged had  
61 a food hygiene handbook in place for their cabin crew at the initial training stage, but  
62 none that I came across were ... specific to the cabin crew environment nor were  
63 they compulsory reading”*. Examples of such handbooks and requirements include:  
64 Catering Guidelines for Flight Attendants (Amineddine, Kraft and Dible, 2006) and  
65 the World Food Safety Guidelines (IFSA, 2016) (Table 1).

66  
67 Insert Table 1: An example of Flight Attendant/ Cabin Crew Training requirements/  
68 guidelines

69  
70 The standard food safety guidelines do not align with the conditions on-board aircraft  
71 and lack focus on the hazards related to cabin crew safe food-handling on board.  
72 Thus, the relationship between cabin crew and food safety is known as the *“crucial  
73 link”* (Sheward, 2001:1) but also as the *“missing link”* (Sheward, 2006:201) to ensure  
74 the significance of providing cabin crew with an effective food safety training,  
75 Sheward (2006) and Abdelhakim (2016) underlined the necessity of mandatory food

76 safety training, commensurate with the different roles of cabin crew, alongside other  
77 safety issues, i.e. medical and emergency training. Additionally, cabin crew food  
78 safety training (CCFST) should account of the time of the flight, the type of flight,  
79 type of service, the cabin class and the role of cabin crew (Abdelhakim et al., 2018).

80  
81 Methodologically, many of consumer food safety related studies are qualitative in  
82 nature. For example, Young, and Waddell (2016) carried out a review study on the  
83 barriers and facilitators to safe food handling among consumers, they found that 37  
84 unique qualitative studies which used interviews, documents analysis for data  
85 collection. Another two recent qualitative study was conducted by Murray et al.  
86 (2017) and Sterniša et al (2018) using a telephone interview to assess the  
87 effectiveness of food safety interventions over time, and know and attitudes of  
88 consumers, respectively.

89  
90 Conversely, most of food handlers food safety related studies used quantitative  
91 methods (Zanin et al., 2017; Moreb, Priyadarshini, and Jaiswal, 2017) and small  
92 range of the research used qualitative methods (Thaivalappil et al., 2018; Arendt et  
93 al, 2012; Araújo et al., 2018). An example of qualitative food handler food safety  
94 studies was undertaken by Latorres et al. (2016). They conducted a course to  
95 evaluate knowledge and perception of issues related to food safety by the cognitive  
96 word association technique (WAT), with total workload of 24 hours. Their findings  
97 revealed that WAT is a significant tool to evaluate the perceptions of food safety  
98 related issues and reinforced the importance of continual participation and  
99 improvement of the professionals in the food industry.

100  
101 Overall, literature and previous research indicates that more attention is required for  
102 effective CCFST. Insufficient training and ineffective evaluations of food safety  
103 training of food handlers may contribute to incidences of food-borne illness (Zanin et  
104 al., 2017; abdelhakim et al., 2018). This implies that there is a need for a qualitative  
105 research to fill this gap in aviation food safety research and specifically to investigate  
106 the current CCFST from airlines' perspective. Thus this paper aims to explore the  
107 significance, extent, levels, training needs relating to cabin crew roles, and the main  
108 food safety precautions relating to cabin crew food-handling on-board. The findings  
109 obtained can be used to inform the development of future CCFST modules and  
110 evaluation.

111

112 **2. Methods**

113 **2.1. Semi-structured interview protocol**

114 In-depth, semi-structured interviews (n=20) were conducted to collect data from  
115 cabin crew managers, training managers, trainers and supervisors to better  
116 understand the current CCFST. In line with the guidelines of Bryman (2004), a three-  
117 part interview schedule was designed and developed based on previous food safety  
118 training literature. The first section determined the respondents' demographic profile  
119 (e.g., role and experience in aviation, age, gender, culture). The second section  
120 focused on food handling on-board to identify the general food handling-related tasks  
121 reported by cabin crew from different airlines and to identify and verify the critical  
122 food safety-related issues on-board. The final part focused on CCFST issues such  
123 levels and comprehensiveness of training within airlines. The interview schedule was  
124 piloted using standard procedures (Seidman, 2013).

125 The interviews were implemented according to respondent availability and access.  
126 Eight were conducted by telephone/Skype, nine by email (e-interview), and three  
127 face-to-face (Table 2). Influences, advantages and disadvantages of using different  
128 modes for interviews in the same study were considered (Opdenakker, 2006) to  
129 ensure reliability and validity of data collected.

130 **2.1 Sampling and recruitment**

131 Target respondents for this study (cabin crew managers/supervisors/trainers) are  
132 recognised as being 'hidden and hard-to-reach' (Johnston and Sabin, 2010).  
133 Therefore, a purposive sampling technique alongside a snowballing technique was  
134 adopted for sampling and recruitment purposes.

135 The initial interview conducted for this study became "the seed" for the snowballing  
136 technique (Johnston and Sabin, 2010:40) who facilitated access to subsequent cabin  
137 crew, managers and supervisors within international airlines.

138 In total, 26 respondents were interviewed in 20 semi-structured interviews. Fourteen  
139 interviews were individual interviews and six were group interviews (two respondents  
140 per group from each of six airlines).The respondents were working for 20 airlines  
141 from the UK, Europe, Middle East, Africa, South America and the United States.

142 **2.3 Ethical considerations**

143 Prior to implementation of this study all methods and relevant documentation  
144 including interview schedules, introductory letters, participant information sheet,  
145 consent form were approved by the Research Ethics Committee (Approval reference

146 3850). Documentation and ethical approval were sent to all participants before  
147 participation in the interview and signed consent was obtained prior to interview  
148 participation.

149  
150 **2.4 Analysis of data**  
151 Qualitative data including semi-structured interview transcripts and supporting  
152 documents (manuals, training materials, etc.) were analysed using a qualitative  
153 content analysis. This technique is widely recognised qualitative analysis tool that  
154 facilitates categorisation and identification of themes within the data (Hsieh and  
155 Shannon, 2005). Interview transcriptions and a range of supporting documents were  
156 coded using NVIVO9; this software provided a means for electronic management,  
157 organisation and of the collated data (Bazeley, 2007).

158  
159 **3. Results**

160 **3.1 The profile of respondents**  
161 From 20 different airlines worldwide, 26 respondents were interviewed with regard  
162 to the current CCFST. Table 2 displays a demographic profile of interviewed  
163 respondents. The majority of respondents (69%) were male; the majority of them  
164 (61.5%) aged between 41 years and 47 years.

165 Insert Table 2: Overview of the respondents' profiles, and interview mode

166  
167 In respect to employment role, (42%) were managers, supervisors (42%) and cabin  
168 crew trainers (16%). Six respondents (23%) reported practical experience as cabin  
169 crew and/or still flying under different titles, including cabin crew training manager  
170 (e.g., A5CCTM), cabin crew supervisor (e.g., A10CCS), and cabin crew service  
171 trainer (e.g., A9CCST1). In addition, most respondents (61.5%) had 10 to 20 years  
172 of experience in the aviation industry. Finally, the ethnicity of the respondents in this  
173 study included a wide range of nationalities and cultures.

174 **3.2 Cabin crew on-board food-handling**  
175 The in-flight food service starts when meals arrive at the galley via a secure high  
176 loader. Once on-board, meals and related items become the responsibility of cabin  
177 crew. Figure 1 illustrates the generic main steps (including critical control points –  
178 CCPs) during handling of airline meals. These sequential steps are the same for  
179 different types of on-board foodservice.

180 Insert Figure 1: On-board food handling steps and related critical control points

181

182 The findings from this study indicate that there are three main types of on-board food  
183 service, according to the length of flights and sectors: short, medium and long-haul.  
184 For example, A1 (Airline1) classified its in-flight foodservice by region; Middle East,  
185 Europe, Asia and Far East, and North America. For each region a range of options  
186 were provided, which varied in the content and the number of food items provided  
187 from one region to another and also varied from one class to another. These stages  
188 involve CCPs which expose specific food safety hazards require considerable  
189 attention from cabin crew, in particular, in the case of depending on 'back/return  
190 catering' or 'double legs catering' on some flights.

191

192 Additionally, a cabin crew manager (A15CCM) and a manager of cabin crew and  
193 specialist of training (A3MCCST) indicated that two airlines (A3 and A15) reportedly  
194 provide the service of "on-board chefs" for passengers in first and business classes  
195 during certain flights and sectors. Such practices may require specific food-handling  
196 and food safety skills. In addition to passenger meals, cabin crew are also  
197 responsible for their own meals, which may be similar to the passengers' meals (e.g.  
198 A14CCS) or different from passengers' meals (e.g., A13CCTM). Cabin crew was  
199 also reported to be responsible for handling the cockpit crew's meals, which always  
200 differed from other meals.

201

### 202 **3.3 The significance of cabin crew food safety issues**

203 All respondents (n=26) believed that on-board food safety is an important, for  
204 example: "food safety is always a major issue while handling food on-board"  
205 (A14CCS); "safe food handling is an important part of the cabin crew's  
206 responsibilities and it is a vital aspect for safe flights" (A17CCTS). Comprehensive  
207 responsibility for food safety was include reported to all components of the food chain  
208 as indicated by a cabin crew training manager "it includes everyone in food chain,  
209 from suppliers, catering staff to flight attendants on-board" (A5CCTM).

210

211 Respondents indicated a variety of reasons that influence the importance of  
212 implementation of food safety practices on-board, these include the following: the  
213 nature of cabin crew duties as food handlers, the legislative requirements, the  
214 advanced preparation of in-flight meals, the type and design of the aircraft and the  
215 lack of space on-board. Supporting this finding a cabin crew manager claimed  
216 that "...food safety is an issue for us....this is due to the nature of in-flight meals

217 *prepared in advance, no space available ... , minimum of cabin crew in some flights”*  
218 (A15CCM). Consequently, although its priority relative to emergency issues,  
219 including fire, violence, and emergency evacuation, cabin crew reportedly perceive  
220 food safety to be a crucial part of any flight safety and therefore airlines should train  
221 cabin crew on food safety and hygiene.

222

### 223 **3.4 The extent of CCFST**

224 Most (92.3%) respondents acknowledged that the majority (90%) of airlines have a  
225 range of CCFST, for example, a cabin safety supervisor stated that *“we train our*  
226 *cabin crew on food safety and how they can avoid food poisoning occurrence”*  
227 (A1SCSS). Conversely, two airlines (A8 and A10) did not include food safety and  
228 hygiene training as part of the airline policy, *“we do not consider such training for*  
229 *our cabin crew”* (A8CCTM); *“we do not have specific training on food safety”*  
230 (A10CCS).

231

232

233 Unexpectedly, a cabin safety director and a supervisor of cabin safety (A1DCS and  
234 A1SCSS) suggested that it is not only cabin crew who should be trained/instructed  
235 on food safety, but also cockpit crew. They argued cockpit crew training had taken  
236 place after a food poisoning incident occurred when a captain and a first officer left  
237 tuna sandwiches open in a cockpit for two hours and then consumed them during a  
238 long-haul flight. After five hours, they started to suffer from food poisoning symptoms.

239

### 240 **3.5 CCFST need analysis**

241 Training Needs Analysis (TNA) is the first step of any training cycle and plays a  
242 significant role in training effectiveness and improvement. Most respondents (75%)  
243 from airlines with CCFST (n=18) emphasised the significance of *“... analysing all*  
244 *cabin crew training needs”* (A9CCST1). However, further findings indicate this it is  
245 not the case when it comes to food safety training, as most of airlines reportedly with  
246 CCFST (77.78%), reportedly did not consider TNA for this type of training. This was  
247 indicated by many respondents, for example: *“... not specifically in the case of food*  
248 *safety training”* (A15CCM); *“No TNA for food safety as training is generic”*  
249 (A7MCSTIS).

250

251 However, respondents from two airlines (A9 and A12) explicitly acknowledged TNA  
252 in relation to CCFST. They used pre-training tests and documentation analysis (e.g.  
253 training records) to analyse their CCFST needs. This was clarified by respondents  
254 from these two airlines, *“before we start the training season we mark our target, what*

255 do we want to achieve, improve. Based on that, we make our training needs  
256 analysis” (A9CCST1); and in details: “we use e-learning which has to be researched,  
257 documented, and legally approved. Based on this, we analyse our cabin crew food  
258 safety training needs” (A12HRS&CCT). Since most respondents indicated that most  
259 participating airlines did not analyse CCFST needs, this may affect negatively the  
260 levels and effectiveness of food safety training for different cabin crew roles.

261  
262 **3.6 Levels of cabin crew food safety training**

263 All respondents (n=24) from airlines with CCFST (n=18) exposed that their airlines  
264 did not consider the different employment roles when training cabin crew on food  
265 safety. This means that airlines reportedly trained all their cabin crew at the same  
266 level of food safety regardless “...their position or which fleet or class they are  
267 working on” (A2RDLCLA1). A cabin crew training supervisor indicated that “all cabin  
268 crew are trained on the same level without discrimination or customisation”  
269 (A6CCTS); “... all of our cabin crew have specific roles if they are senior cabin crew,  
270 but all of them are trained in exactly the same way with regards to food safety, we  
271 do not have any specific extra modules” (A2RDLCLA1).

272  
273 **3.7 Awareness of key food safety precautions in airlines**

274 Most of respondents (77%) acknowledged a range of general and basics food safety  
275 and hygiene precautions (Table 3). These precautions were often mentioned in the  
276 airlines' manuals as basics of handling food safely. Additionally, the study assessed  
277 the cabin crew food safety awareness with these precautions.

278 Insert Table 3: The key food safety precautions in airlines  
279

280 The effective implementation of the tabulated precautions can maintain the food as  
281 safe as possible and to prevent or at least to minimise food poisoning occurrences  
282 onboard. In addition, a specific range of food safety knowledge, awareness and  
283 attitudes is required to be provided to cabin crew. This can be improved by an  
284 effective training on food safety and hygiene. Such training should not be only relate  
285 to the published food poisoning incidents in aviation, but is also required for  
286 maintaining a high level of food safety onboard.

287  
288 **4. Discussion**

289 Cabin crew have a range of food service-related duties on-board which differ from  
290 one airline to another based on many factors, including the type of airline, duration  
291 of flight and its operating systems (Sheward, 2006; Abdelhakim et al, 2018). The



292 findings from this study concur with previous research findings which indicate that  
293 cabin crew have been perceived as: *“trolley dollies”* or *“space waitresses”* (Morgan  
294 and Nickson, 2001:449) or *“chefs, or merely waiters in the sky”* (Sheward, 2006:204).  
295 This confirms the professionalism of cabin crew food-handling duties. To perform  
296 effective and safe food-handling, cabin crew need appropriate food safety training to  
297 reduce any suspected food safety risk on-board (Sheward, 2006; Abdelhakim,  
298 2016).

299  
300 In general, airline managers and supervisors who participated in this study reported  
301 the significance of food safety in aviation particularly in relation to cabin crew in-flight  
302 food-handling duties. Indeed, training cabin crew is an important issue for the safety  
303 of passengers, cockpit crew and cabin crew themselves (Abdelhakim, 2016;  
304 Sheward, 2006; Abdelhakim et al, 2018). Consequently, most airlines reported a  
305 range of training on/instructing for their cabin crew about food safety. These findings  
306 are in response with the World Food Safety Guidelines for Airline Catering (IFSA,  
307 2016:32): *“food safety handling procedures to be included in flight attendant training  
308 and refresher course as necessary”*. This training is essential to: *“ensure that flight  
309 attendant/ cabin crew have sufficient knowledge to enable them to handle food  
310 safely”*.

311  
312 Conversely, in this study all airlines participating who reported food safety training  
313 indicated that they trained different roles of cabin crew to the same level. These  
314 findings do not meet the legislative requirements in aviation guidelines and  
315 researches recommendations (e.g., IFSA, 2016; Amineddine, Kraft, and Dible, 2006;  
316 Abdelhakim, 2016; Abdelhakim et al., 2018) that the level of training should reflect  
317 the requirements of the role being undertaken. For instance, Sheward (2006)  
318 suggested various levels of cabin crew food safety training depending on the  
319 provision of on-board food service and flight sector and the required competence,  
320 experience, and work duties of cabin crew for each sector.

321  
322 Conversely, all food handlers, including cabin crew, are not required to go through  
323 standardised, certified training. However, it can be suggested that they training  
324 commensurate with their work tasks may be benefit. This study suggested that the  
325 current CCFST in airlines participating in this study does not correspond with all  
326 cabin crew roles and their food handling duties on-board; previous research  
327 suggested that this could cause a greater risk to food safety than no training at all  
328 (Zanin, et al., 2017). The anticipated risks to food safety may be greater in aviation

329 than those in other catering establishments, due to the nature of flight catering and  
330 the lack of published data and access to the customer food safety-related  
331 complaints. Thus, there is a need to undertake training needs assessment to indicate  
332 the most appropriate and effective training strategy to address different employment  
333 roles (Abdelhakim et al, 2018).

334  
335 Furthermore, several studies on the knowledge, attitudes and practices of food  
336 safety of food handlers and consumers (see for example, Araújo, et al, 2018; Zanin,  
337 et al., 2017) have supported the importance of conducting a preliminary assessment  
338 of training needs and evaluating the effectiveness of training. These studies also  
339 indicated that the continuous food safety training is needed to minimise the risk of  
340 food consumed on-board. TNA helps to identify the current gaps in food safety  
341 knowledge, attitudes and practices of food handlers in relation to daily work duties,  
342 and who should be trained and to which level (Seaman, 2010; Gomes et al., 2014;  
343 Zanin, et al., 2017).

344  
345 In this study, the majority of managers and supervisors reported that airlines have  
346 considered the analysis of training needs for generic cabin crew training but not for  
347 food safety training. Therefore, all participating airlines who reported implementation  
348 of CCFST trained different roles of cabin crew to the same level of food safety  
349 training. This level of training was found to differ from one airline to another according  
350 to the airline's operating system and available financial resources. Managerial  
351 respondents suggested that cabin crew on-board food handling duties are less  
352 demanding compared to those in restaurants and other catering establishments, so  
353 that cabin crew roles were not considered when training about food safety.

354  
355 These findings do not concur with what is suggested by food safety legalisation, for  
356 example the European Union Regulation (EC) required that food business operators  
357 should ensure that: '*Food handlers are supervised and instructed and/or trained in*  
358 *food hygiene matters commensurate with their work activity*' (Sprenger, 2015). While  
359 there is no one, single, "off the shelf" (improve ltd, 2008:11) food safety training  
360 programme, Zanin, et al. (2017) suggested a model for food safety training to cover  
361 all food handling categories commensurate with food handling duties. However, this  
362 would be inappropriate, as a single training programme would be too broad in its  
363 coverage, if it were required to cover the training needs of all food handlers who  
364 handle food as part of their job (Seaman, 2010).

365

366 **6. Conclusion and implications**  
367 This is the first study on CCFST and therefore a qualitative approach was adopted  
368 to explore and understand the current situation of cabin crew food safety from the  
369 airlines' perspective. The study employed snowballing as a non-probability sampling  
370 technique which leads to potential issues relating to the representativeness of the  
371 sample. However, it could be argued that the sample size of this study (20 airlines)  
372 is relatively representative for a variety of reasons; including, the aim and the nature  
373 of this qualitative study are only being used to explore and understand the study  
374 phenomenon; the frequencies are not important for this study (e.g. Ritchie, Lewis  
375 and Elam, 2003); the sample participating achieved the study aim and saturation  
376 since participants came from different airlines and from different areas of the world:  
377 Middle East; Africa; South America; the USA. In addition, the sample included  
378 different types of airlines; scheduled or flag carriers, charter, domestic and low-cost  
379 carriers. This focused understanding of cabin crew food handling and safety from  
380 different perspectives.

381  
382 However, this study suggested that the current CCFST approaches may be  
383 inappropriate or ineffective for different cabin crew roles and food-handling duties  
384 on-board. Overall, airlines reportedly train their cabin crew about the general or  
385 previously-determined training without identifying the real and risk-based food safety  
386 training needs. Such conclusions lead to further studies to evaluate the effectiveness  
387 of CCFST in concurrence with the barriers to, and features of CCFST using the  
388 methodology developed by Gomes et al. (2014) and recommendations of Zanin, et  
389 al. (2017) and Abdelhakim et al. (2018). Another study may consider the observation  
390 of the actual behaviours of cabin crew while handling food on-board.

391  
392 Professionally, the findings of this study are the result of in-depth study with 20  
393 international airlines worldwide. This may inform airlines when they are designing or  
394 choosing their CCFST programmes. Finally, the findings may help in building a  
395 global strategy for cabin crew food safety training through the international aviation  
396 organisations such as IATA and IFSA. This will increase the level of trust and loyalty  
397 in airlines food service stakeholders.

398  
399 **7. Acknowledgments**  
400 The authors wish to acknowledge the financial support of the FFEEBB programme,  
401 which enabled this study of cabin crew food safety training. They also wish to  
402 acknowledge the participation of the many cabin crew who participated in this study.

403 Last, but by no means least, they wish to acknowledge the ongoing support and  
404 encouragement of the late Professor Louise Fielding.

## 405 **8. References**

406 Abdelhakim, A. (2012). *Cabin crew food safety training- the weak link*. Poster,  
407 Llandaff Campus, Western Avenue, Cardiff, Wales, UK.

408 Abdelhakim, A. (2016). *Cabin crew food safety training: an exploratory study* (Ph.D).  
409 Cardiff Metropolitan University, Cardiff, Wales, UK.

410 Abdelhakim, A. S., Jones, E., Redmond, E. C., Griffith, C. J., & Hewedi, M. (2018).  
411 Evaluating cabin crew food safety training using the Kirkpatrick model: an  
412 airlines' perspective. *British Food Journal*, 120(7), 1574-1589.

413 Amineddine, M., Kraft, P. & Dible, J. (2006). *Catering guidelines for flight attendants*.  
414 <http://www.corporateflyer.net/catering-guidelines.pdf>/Accessed 24.03.2016.

415 Araújo, W. M., Zandonadi, R. P., Tenser, C. M., Farage, P., & Ginani, V. C. (2018).  
416 Importance and level of adoption of food safety tools in foodservices. *Journal*  
417 *of Culinary Science & Technology*, 1-20.

418 Arendt, S. W., Roberts, K. R., Strohbehn, C., Ellis, J., Paez, P., & Meyer, J. (2012).  
419 Use of qualitative research in foodservice organizations: A review of  
420 challenges, strategies, and applications. *International Journal of*  
421 *Contemporary Hospitality Management*, 24(6), 820-837.

422 Bazeley, P. (2007). *Qualitative data analysis with NVivo*. Los Angeles: SAGE.

423 Bryman, A. (2004). *Social research methods*. Oxford University Press.

424 Cabincrew (2010). *Cabin crew course, career as flight attendant, flight attendant*  
425 *jobs, flight attendant training, air hostess course, air hostess training*.  
426 Cabincrewdirect.com. Available at:  
427 <http://www.cabincrewdirect.com/index.asp/> Accessed 20.10. 2010.

428 Emirates Group. (2015). Cabin crew requirements. [online] Available at:  
429 [http://www.emiratesgroupcareers.com/english/Careers\\_Overview/cabin\\_crew/requirements.aspx/](http://www.emiratesgroupcareers.com/english/Careers_Overview/cabin_crew/requirements.aspx/) Accessed 20.04. 2015.

431 Evans, E. W., & Redmond, E. C. (2014). Behavioral risk factors associated with  
432 listeriosis in the home: a review of consumer food safety studies. *Journal of*  
433 *food protection*, 77(3), 510-521.

434 Eves, A. & Dervisi, P. (2004). Food safety management. in: P. Jones, (Ed.). *Flight*  
435 *catering* (pp. 168-192. Oxford: *Butterworth-Heinemann*.

436 Gomes, C. C. B., Lemos, G. F. C., Silva, M. C., Hora, I. M. C., & Cruz, A. G. (2014).  
437 Training of food handlers in a hotel: Tool for promotion of the food  
438 safety. *Journal of food safety*, 34(3), 218-223.

439 Greenhawt, M., MacGillivray, F., Batty, G., Said, M., & Weiss, C. (2013).  
440 International study of risk-mitigating factors and in-flight allergic reactions to  
441 peanut and tree nut. *The Journal of Allergy and Clinical Immunology: In  
442 Practice*, 1(2), 186-194.

443 Hatakka M. (2000). *Hygiene quality of foods serviced on aircarfts*. Master, University  
444 of Helsinki. Available from:  
445 <http://ethesis.helsinki.fi/julkaisut/ela/elint/vk/hatakka/hygienic.pdf> / Accessed  
446 19.02.2016.

447 Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content  
448 analysis. *Qualitative health research*, 15(9), 1277-1288.

449 International Flight Services Association (IFSA) (2016). *World food safety guidelines  
450 for airline catering*.4<sup>th</sup> version, [online] Available at:  
451 [http://www.ifsanet.com/resource/resmgr/WFSG\\_Layout.pdf](http://www.ifsanet.com/resource/resmgr/WFSG_Layout.pdf) Accessed:  
452 16.04.2017.

453 Johnston, L. G., & Sabin, K. (2010). Sampling hard-to-reach populations with  
454 respondent driven sampling. *Methodological innovations online*, 5(2), 38-48.

455 Jones, P. (2007). Flight Catering. In: Becker, H. & Grothues, U. (2007). *Catering-  
456 Management Portrait einer Wachstumsbranche in Theorie und Praxis*, (pp.  
457 39-55). Hamburg: Behr's Verlag.

458 Latorres, J. M., Rancatti, A., Lasta, D., Queiroz, M. I., & Mitterer-Daltoé, M. L. (2016).  
459 Cognitive evaluation as a food safety tool—a food handler case study. *Journal  
460 of Food Safety*, 36(4), 497-502.

461 McMullan, R., Edwards, P. J., Kelly, M. J., Millar, B. C., Rooney, P. J., & Moore, J.  
462 E. (2007). Food-poisoning and commercial air travel. *Travel medicine and  
463 infectious disease*, 5(5), 276-286.

464 Moreb, N. A., Priyadarshini, A., & Jaiswal, A. K. (2017). Knowledge of food safety  
465 and food handling practices amongst food handlers in the Republic of  
466 Ireland. *Food Control*, 80, 341-349.

467 Murray, R., Glass-Kaastra, S., Gardhouse, C., Marshall, B., Ciampa, N., Franklin,  
468 K., & Nesbitt, A. (2017). Canadian Consumer Food Safety Practices and  
469 Knowledge: Foodbook Study. *Journal of food protection*, 80(10), 1711-1718

470 Opendakker, R. (2006, September). Advantages and disadvantages of four  
471 interview techniques in qualitative research [online]. Forum Qualitative  
472 Sozialforschung / Forum: Qualitative social research, 7(4), Art. 11, [http://nbn-  
473 resolving.de/urn:nbn:de:0114-fqs0604118/](http://nbn-resolving.de/urn:nbn:de:0114-fqs0604118/) Accessed 16.01.2015.

474 Radu, S., Othman, M., Toh, P. S., & Chai, L. C. (2014). Assessment of knowledge,  
475 attitude and practices concerning food safety among restaurant workers in  
476 Putrajaya, Malaysia. *Food Science and Quality Management*, 32, 20-27.

477 Ritchie, J.; Lewis, J. and Elam, G. (2003). Designing and selecting samples. In  
478 Ritchie, J. and Lewis, J. (Eds.) *Qualitative research practice. A guide for*  
479 *social science students and researchers* (pp.77-108) Thousand Oaks, CA:  
480 Sage.

481 Seaman, P., & Eves, A. (2010). Perceptions of hygiene training amongst food  
482 handlers, managers and training providers—A qualitative study. *Food*  
483 *Control*, 21(7), 1037-1041.

484 Seidman, I. (2013). *Interviewing as qualitative research: A guide for researchers in*  
485 *education and the social sciences*. Teachers college press.

486 Sheward, E. (2001). In-flight food safety: Cabin crew – the crucial link. *CSU*, 7(9), 1-  
487 3.

488 Sheward, E. (2006). *Aviation food safety*. Oxford: Blackwell Pub.

489 Sterniša, Meta, Sonja Smole Možina, Sonja Levstek, Andreja Kukec, Peter Raspor,  
490 and Mojca Jevšnik(2018). Food safety knowledge, self-reported practices  
491 and attitude of poultry meat handling among Slovenian consumers. *British*  
492 *Food Journal*, 120 (6), pp.1344-1357.

493 Thaivalappil, A., Waddell, L., Greig, J., Meldrum, R., & Young, I. (2018). A systematic  
494 review and thematic synthesis of qualitative research studies on factors  
495 affecting safe food handling at retail and food service. *Food Control*.89, 79-  
496 107.

497 Yavari, H., Jahed-Khaniki, G., Mohseni, M., & Kamali, K. (2015). Implementation of  
498 hazard analysis critical control point in one of the Iranian flight catering  
499 establishment: technical barriers and strategies. *Journal of Food Safety and*  
500 *Hygiene*, 1(1), 1-7.

501 Young, I., & Waddell, L. (2016). Barriers and facilitators to safe food handling among  
502 consumers: a systematic review and thematic synthesis of qualitative  
503 research studies. *PloS one*, 11(12), e0167695.

504 Young, I., Reimer, D., Greig, J., Turgeon, P., Meldrum, R., & Waddell, L. (2017).  
505 Psychosocial and health-status determinants of safe food handling among  
506 consumers: A systematic review and meta-analysis. *Food Control*, 78, 401-  
507 411.

508 Young, I., Waddell, L., Harding, S., Greig, J., Mascarenhas, M., Sivaramalingam, B.,  
509 ... & Papadopoulos, A. (2015). A systematic review and meta-analysis of the

510 effectiveness of food safety education interventions for consumers in  
511 developed countries. *BMC public health*, 15(1), 822.

512 Zanin, L. M., da Cunha, D. T., de Rosso, V. V., Capriles, V. D., & Stedefeldt, E.  
513 (2017). Knowledge, attitudes and practices of food handlers in food safety:  
514 An integrative review. *Food Research International*, 100, 53-62.

515

516

TABLES

517 Table 1: An example of Flight Attendant/ Cabin Crew Training requirements/ guidelines

<b>Standard Operating Procedures(SOP): Flight Attendant/ Cabin Crew Training</b>	
<b>Standard</b>	
<b>Flight Attendant / Cabin Crew shall be adequately trained in safe food handling practices applicable to their work</b>	
<b>Purpose</b>	To ensure that flight attendant/ cabin crew have sufficient knowledge to enable them to handle food safety.
<b>Scope</b>	All flight attendants/ cabin crew
<b>Guidelines</b>	
<b>Procedure</b>	<ul style="list-style-type: none"> <li>• <i>Food safety handling procedures are to be included in flight attendant training and refresher courses as necessary.</i></li> <li>• <i>Training can be delivered by a variety of methods including lecture, written material, computer based training, etc.</i></li> <li>• <i>All training should include recorded assessment/testing.</i></li> </ul> <p><b>Points to be covered:</b></p> <ul style="list-style-type: none"> <li>• <i>Personal hygiene including: proper hand washing prior to beverage service and meal service; reporting illnesses</i></li> <li>• <i>Cooling methods used to maintain proper food temperatures on board the aircraft until all food service(s) is complete</i></li> <li>• <i>Cooking, re-heating and/or maintaining hot food temperatures</i></li> <li>• <i>Prevention of food and equipment biological, chemical and physical contamination (e.g. rims of cups/glasses, service equipment, food allergen cross contact, ice.)</i></li> <li>• <i>Food complaint procedures</i></li> <li>• <i>Proper segregation practices for keeping dirty equipment segregated from food that has not yet been served</i></li> <li>• <i>During interval between first and second service, meals should not be placed into a warm oven. (Cooking time instructions to be followed.)</i></li> <li>• <i>Do not pre-heat ovens unless short haul service requires expedited meal preparation.</i></li> <li>• <i>Proper de-catering processes for all crew food / meals</i></li> </ul>
<b>Airline Audit</b>	<i>Review training procedures and available documents</i>

518

Source: International Flight Services Association (IFSA) (2016:51)

519

520

521

522

523

524

525

526

527

528

529

530



Table 2: Overview of the respondents' profiles, and interview mode

Airline	Interviewee's position & Code	Status	Sex	Age	Years in aviation	Ethnicity	Education level	Interview mode
A1	Director of Cabin Safety Department (A1DCS)	Management	M	47	18	Arabian	Bachelor	Telephone
	Supervisor - Cabin Safety Specialist (A1SCSS)	Operation	M	42	15	Arabian	Bachelor	
A2	Research and Development Lead at Customer Learning Academy (A2RDCLA1)	Management	F	43	14	British	Bachelor	Telephone
	Research & Development Lead at Customer Learning Academy (A2RDCLA2)	Management	F	38	13	British	High School	
A3	Manager Cabin Crew & Sep. Training (A3MCCST)	Management	F	46	22	British	Bachelor	E-interview
	Senior Manager In-flight Services (A3SMIS)	Management	M	51	24	Holland	Bachelor	
A4	Cabin Crew Manager (A4CCM)	Operation & Management	M	41	12	Portuguese	Master	Telephone
A5	Cabin Crew Training Manager (A5CCTM)	Operation & Management	F	53	31	Arabian	Master	Face-to-face
A6	Cabin Crew Training Supervisor (A6CCTS)	Operation & Management	M	45	13	Arabian	Bachelor	Face-to-face
A7	Manager Customer Standards and Training of In-flight Services (A7MCSTIS)	Management	F	38	14	African	Bachelor	E-interview
	Manager Service Standards & Cabin Crew Training (A7MSSCCT)	Management	F	42	11	African	Master	
A8	Cabin Crew Training Manager (A8CCTM)	Management	F	58	37	Arabian	Bachelor	Face-to-face
A9	Cabin Crew Service Trainer (A9CCST2)	Operation & Management	M	33	7	Latvians	Bachelor	Telephone
	Cabin Crew Service Trainer (A9CCST2)	Operation & Management	M	37	10	Latvians	Bachelor	
A10	Cabin Crew Supervisor (A10CCS)	Operation & Management	M	34	9	Egyptian	Bachelor	Telephone
A11	Cabin Crew Supervisor (A11CCS)	Operation	M	41	14	Egyptian	Bachelor	E-interview
A12	Humanitarian Response Specialist & Cabin Crew Trainer (A12HRS&CCT)	Management	M	45	21	Arabian	Bachelor	Telephone
A13	Cabin Crew Service Trainer (A13CCST)	Management	M	45	11	American	Bachelor	Telephone
	Cabin Crew Supervisor (A13CCS)	Operation	M	44	12	American	Bachelor	
A14	Cabin Crew Supervisor (A14CCS)	Operation	M	36	8	German	Bachelor	Telephone
A15	Cabin Crew Manager (A15CCM)	Operation & Management	M	47	18	French	High School	E-interview
A16	In-flight Products Managers & Catering Coordinator (A16IFPM&CC)	Management	M	45	16	Swiss	High School	E-interview
A17	Cabin Crew Training Supervisor (A17CCTS)	Management	F	41	8	Greek	Bachelor	E-interview
A18	Cabin Crew Supervisor (A18CCS)	Operation	M	43	16	Swiss	Bachelor	E-interview
A19	Cabin Crew Supervisor (A19CCS)	Operation	M	32	7	Filipino	Bachelor	E-interview
A20	In-flight Service Manager (A20IFSM)	Management	M	41	15	Greek	Bachelor	E-interview

532

533

534

535

536

537

538

539

540

Table 3: The key food safety precautions in airlines

Precaution	Evidence
<b>1.Understanding food safety basics</b>	<i>"... cabin crew should be familiar with types of food poisoning caused by bacteria and microorganisms like Salmonella, Listeria, E-coli, etc. and how a meal can be contaminated. They should also be aware with all the necessary precautions related to safe food storage onboard"</i> (A17CCTS).
<b>2.Dissimilarity of flight deck meals</b>	<i>"Captain's meal is always different from and never the same as the other cockpit crew members or cabin crew or passengers"</i> (A16IFPM&CC).
<b>3.Special meals and food allergy</b>	<i>"... it is crucial to consider food allergy within passengers and crews. On giving a wrong meal or item to a passenger(s) with allergic considerations, it could be a real disaster"</i> (A5CCTM).
<b>4.Procedures of handling onboard food safety related complaints(e.g. physical contamination)</b>	<i>"... if any passenger attracts our attention to any issue in relation to the safety of food served onboard which could be a hair or anything else, it could be the meal goes back to the central catering unit for control and investigation according to our investigation procedures and system"</i> (A12HRS&CCT).
<b>5.Temperature control</b>	<i>"... We always have bio-fresh egg. ...it doesn't matter how the passenger would like to have his scrambled egg; all eggs cooked onboard have to be well-done! It has to be well-done, just to minimise the risk of any food poisoning and we have to advise and inform passengers and say sorry it has to be well- done! "</i> (A14CCS).
<b>6. Meal reheating precautions</b>	<i>"They know they must not reheat food more than once"</i> (A12HRS&CCT).
<b>7. Personal and hand hygiene</b>	<i>" Personal and hand hygiene is also important like keeping nails short, washing hands before service and after handling waste, not replacing the use of soap and water with sanitiser or wet tissues and always washing hands after using the toilet</i> (A17CCTS).
<b>8.Infectious diseases (e.g., bird flu)</b>	<i>" ...we distribute many bulletins and leaflets to spread and raise the food safety and hygiene culture amongst our cabin crew"</i> (A1DCS).
<b>9. Reporting technical and maintenance issues</b>	<i>"In some cases aircraft food chillers temperature may fluctuate due to technical issues and at this point if cabin crew do not know how to handle food safely. This may lead to serving of unsafe food"</i> (A11CCS).
<b>10. Cabin crew sickness (e.g., diarrhoea)</b>	<i>" Cabin crew should realise that working while being ill especially with upset stomachs and diarrhoea, shows a lack of awareness of food safety and may lead to food contamination on-board"</i> (A17CCTS).
<b>11.Cross contamination</b>	<i>"... they should not put things together, e.g. they cannot mix used and unused trays or plates and utensils in the same trolley"</i> (A5CCTM).

544

**FIGURES**

545

Figure 1: On-board food handling steps and related critical control points

546

547

548

549

550

551

552

553

554

555

556

557

558

559

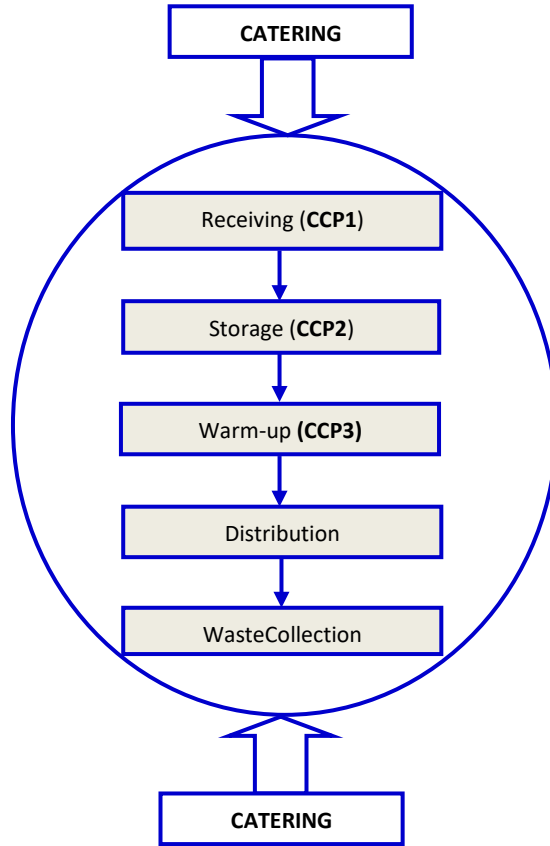
560

561

562

563

564



Source: Adapted from the in-flight service manual of Airline9 (2012)

565

566

### **The Highlights**

567

568

- Most of airlines participated in this study (90%) train cabin crew on food safety.

569

- Different cabin crew roles are trained to the same level of food safety training.

570

- Most of airlines reportedly with CCFST did not consider TNA.

571

- The current CCFST approaches may be inappropriate for different cabin crew roles.

572

573

- Further studies are required to evaluate the effectiveness and features of CCFST.

574

575