

Assessing food safety culture in Japanese schools' foodservices

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Introduction

Outbreaks of foodborne illnesses are global issues and continue to occur frequently in many countries, including Japan. In Japan, foodservice facilities have applied the Ministry of Health, Labour and Welfare's "sanitary management manual in large scale foodservice facilities" and thorough efforts have been required to prevent food poisoning and provide safety meals. It is essential to prevent the outbreak of foodborne illness, especially in school foodservices because of the industrial size of schools and higher health risks in children. School foodservices are managed in accordance with the procedures and standards of a sanitary management program for school meal facilities, which is based on the Hazard Analysis and Critical Control Point (HACCP) and the associated manuals from the Ministry of Education, Culture, Sports, Science and Technology (MEXT). However, studies have reported that food handlers' practices, rather than their food safety knowledge, is a critical factor in the prevention of foodborne illnesses. Moreover, their practice, decision-making, and attitudes are influenced multi-dimensionally by the perceived "Food Safety Culture (FSC)" of an organization. The concept of FSC has been considered as a culture in which the values, beliefs, and attitudes of organizations or individuals attach importance to food safety and hygiene. Nowadays, it is required to assess FSC objectively for the purpose of improving food industry organizations' practices, and various methods have been tried and discussed, including not only assessment tools, such as questionnaires and quantitative methods, but also interviews and qualitative observations. Nevertheless, some of these assessment tools have not been examined for validity and reliability; further, there is no known literature or empirical studies on FSC in Japan. Thus, this study develops and validates a scale that can be used to assess FSC among Japanese food handlers in schools.

Study 1. Factors related to food safety culture (FSC) among food handlers in schools: a qualitative study

The purpose of this study was to explore factors related to food safety culture and to gather items for the FSC assessment scale qualitatively. We conducted six in-depth, semi-structured focus group interviews consisting of school food handlers (n=32) in Tokyo, Japan. Thematic

analysis was used to extract meaning from the data. Findings demonstrate the following multi-level factors related to FSC in school foodservice: (1) individual; (2) organization; (3) environment; (4) management; and (5) management style. We also present the current situation and challenges of sanitary management in school foodservice.

Study 2. The development and validation of a food safety culture (FSC) assessment scale

This study purposed (1) to develop and validate a measurement scale assessing food safety culture (FSC) for use in school foodservice based on the results of Study 1, and (2) to verify whether this scale can be used to detect the differences between organizations (or schools) regarding their FSC.

Study 2-1. The development of a food safety culture (FSC) assessment scale

This study aimed to develop an assessment scale for food safety culture (FSC) in school foodservice. We conducted a questionnaire survey for school food handlers (i.e., cooks, dieticians) to take, and which consisted of 36 items based on results of Study 1. Further, based on responses from Japanese school food handlers (n=1408), an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to extract a factor structure, and the reliability (Cronbach's alpha value), and construct and criterion-related validity of the scale were assessed. The scale was constructed as a 20-item FSC assessment with the following subscales: Underestimation of risk, Surrounding support, Communication, Facilities and equipment, and Commitment. We obtained good fitness indicators from each examination (GFI = 0.949, AGFI = 0.932, CFI = 0.939, RMSEA = 0.051). The total score on this scale moderately correlated with self-reported behaviors ($r_s = 0.427$, $p < 0.01$), injunctive norms ($r_s = 0.355$, $p < 0.01$), and descriptive norms ($r_s = 0.472$, $p < 0.01$), but only slightly with knowledge ($r_s = 0.105$, $p < 0.01$). As such, the scale's reliability and validity were confirmed.

Study 2-2. The validation of a food safety culture (FSC) assessment scale in school foodservice: comparison based on individual characteristics

The purpose of this study is to examine the relationships among individual perception of food safety culture (FSC), individual characteristics (i.e., age, gender, years of foodservice experience), and facility characteristics (i.e., total meals served, number of employees, management style). We compared the scores of the whole scale and five subscales obtained from the same responses in Study 2-1 (n=1408), by using Kruskal-Wallis test and post-hoc

tests with Bonferroni, if necessary. The results show that the perception of FSC is significantly different among age, gender, years of foodservice experience, employment status, position, experience with accidents, management system, type of supply, and total meals served.

Study 2-3. The validation of a food safety culture (FSC) assessment scale in school foodservice: comparison based on organizational characteristics

This study purposed to verify whether a food safety culture (FSC) assessment scale can detect the differences between the FSC among organizations. We performed a cluster analysis using five subscale scores of organizations. As a result, five clusters were extracted: (1) mutual cultivation type; (2) optimism type; (3) lacking communication type; (4) enhanced facility type; (5) individual dependence type. A comparison of the characteristics of the facilities between the clusters revealed that (1) mutual enlightenment type and (4) facility enhancement type had a high ratio of facilities that had 6-10 employees and were contracted and non-central. On the other hand, (5) individual dependent type had a high ratio of facilities that served 501-1001 meals, and were self-operated and central (for two schools). Furthermore, results indicate that the better the FSC score rating, the lower the occupational stress (fatigue, anxiety, depression), and the higher the scores for food safety knowledge, descriptive norms, and self-reported food safety practices.

Study 3. Triangulation of food safety culture assessment in school foodservice

The aim of this study is to examine more valid methods of food safety culture assessment. In school foodservice facilities, we used a mixed approach with a questionnaire survey that included FSC assessment scale, and an observation survey. Documents were then collected and analyzed. The results show that there are differences in actual food safety practices between facilities. A similar tendency was found in the analysis of documents, while the FSC assessment scale had little difference between facilities. In other words, this scale did not necessarily reflect actual food safety practices. This study suggests that FSC may not always be properly measured using a single method, such as the FSC scale used in this study, and that triangulation is important in FSC assessment in school foodservice.

Conclusion

This study developed a food safety culture (FSC) assessment scale as a tool to measure FSC in school foodservice and confirmed the validity and reliability of the scale. We also indicated

the importance of triangulation. In addition, we revealed that the capacity and availability of facilities has become an issue in many schools. Further research is needed to examine the contents of the intervention program for cultivating FSC in school foodservice and to measure and evaluate FSC in long-term case studies.