

# Evaluation of food safety and quality improvement approaches to improve factors that influence food safety culture in the food industry

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## Introduction

As prevalence of foodborne disease in the global population persists<sup>1</sup>, food safety management is a priority for stakeholders in the food chain. Food safety culture (FSC) is reported to underpin a robust food safety management system, therefore businesses within the food sector have a need to assess and improve FSC. To achieve this, effective improvement mechanisms are required and research suggests that bespoke and targeted interventions may be more effective<sup>2</sup>.

During the past 25 years, a number of food safety intervention review publications have been undertaken in a variety of food-related sectors resulting in recommendations for food service establishments<sup>3,4</sup> and for public health food safety interventions<sup>5,6</sup>. Undertaking evaluations of previous studies can identify successful and unsuccessful improvement strategies, including utilisation of targeted food hygiene interventions in public health improvement<sup>6</sup>.

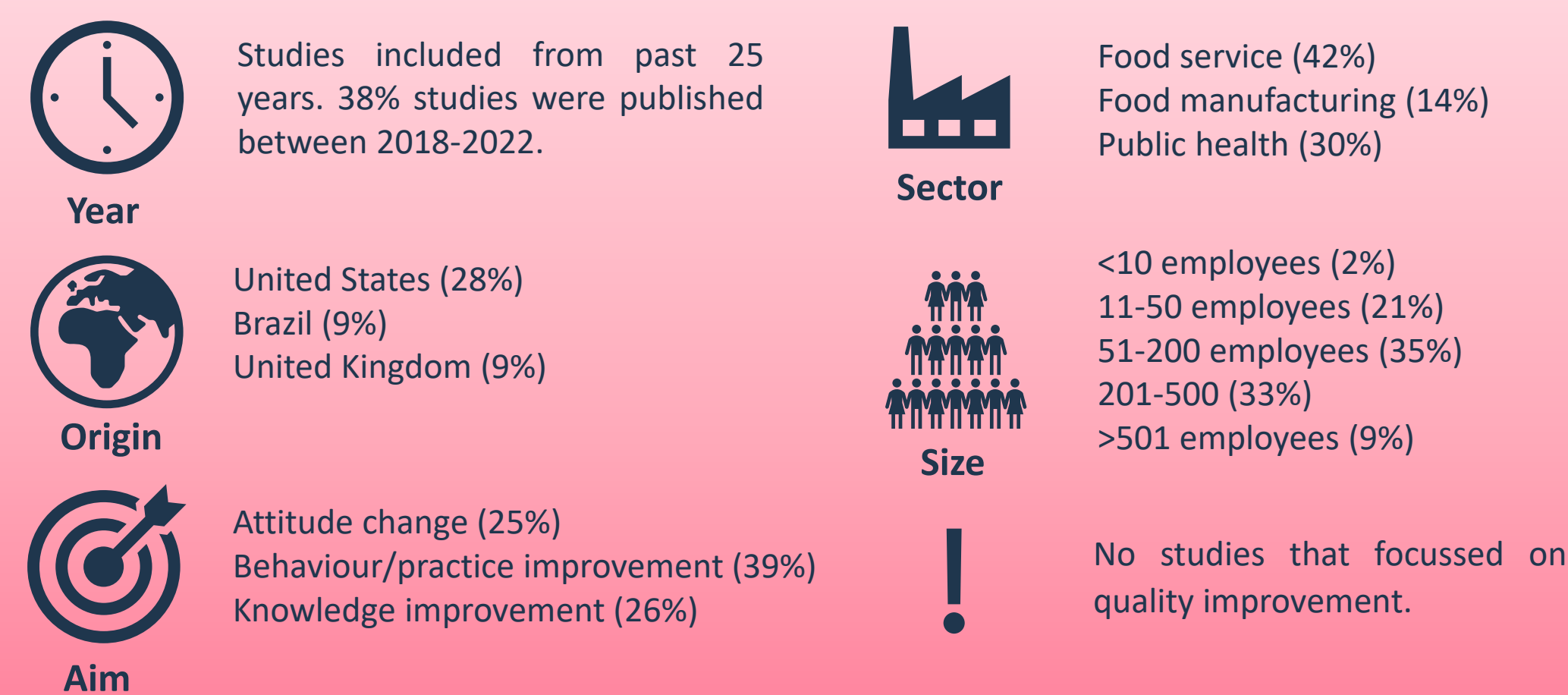
Identifying successful intervention strategies may help influence successful FSC improvement strategies in food and drink manufacturing and processing (FDMP) environments. To date, there have been limited studies relating to food safety and quality improvement within the FDMP sector and related areas.

## Aim

This study has aimed to identify successful approaches used for development, implementation and evaluation of food safety and quality improvement interventions within the food sector.

## Results and Discussion

### Reviewed Paper Characteristics



### Identified Interventions

Interventions that have been identified as successfully achieving the studies' aims are documented within Figure 2.

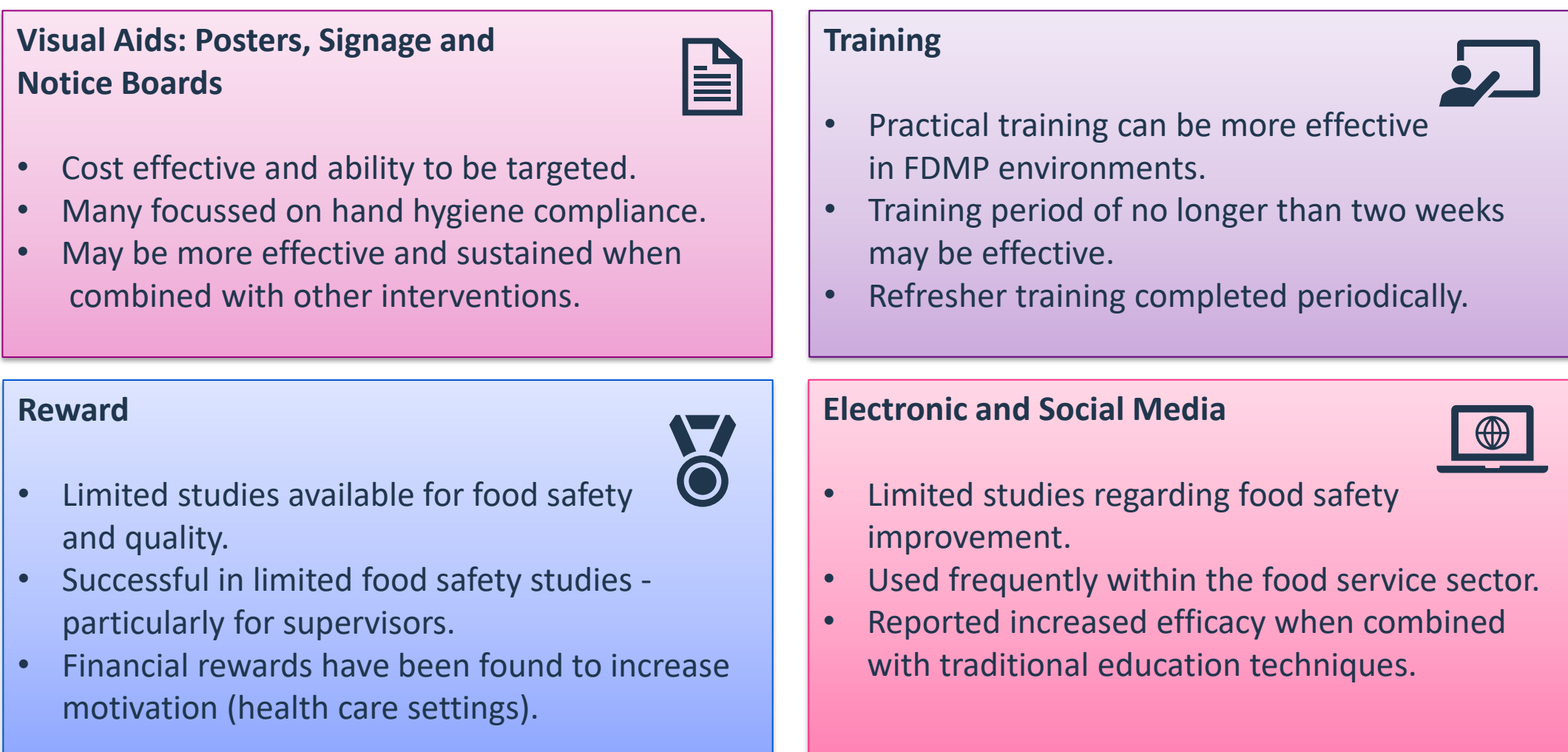


Figure 2 – Key improvement interventions and findings

Within this review, it has been identified that 64% of studies used multiple intervention approaches to achieve intended aims. Research has shown that use of multiple channels and sources of information may increase potential effectiveness of educational initiatives<sup>14</sup>. Using a combination of approaches can provide robustness to an intervention package<sup>17</sup>. Using multiple approaches can reinforce knowledge and desired behaviours and may also ensure that different learning styles are addressed across a population.

## Methodology

A systematic literature search was undertaken according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology<sup>10</sup> to systematically identify relevant intervention studies. The design of the review is displayed in Figure 1.



Figure 1 – Literature review design  
Adapted from<sup>7,8,9</sup>.

The following criteria were used to determine inclusion of studies: primary studies in food safety practice and FSC improvement in FDMP environments, food service environments and public health. It is recognised that processes, procedures and strategies may be varied between these settings; however, information delivery and application of food safety interventions may have cross sector relevance and therefore both have been included within the scope of this review.

Review analyses determined:

- Types of interventions utilised for cognitive and behavioural improvement in the sector.
- Intervention effectiveness relating to improved cognitions and behaviours.
- The extent that key FSC parameters have been addressed in relation to food safety.

Ethical approval for the review was obtained from the Cardiff Metropolitan School of Health Sciences Ethics Committee (Project Reference Number: PGR-4359).

### Intervention Effectiveness

- Intervention effectiveness was evaluated in 92% of studies, with pre- and post- intervention questionnaire being the most frequently utilised evaluation tool (74%); baseline data was collected in 71% studies. Behavioural change was determined in 25% of studies reviewed.
- Overall, 77% of interventions implemented were successful at improving the targeted area.
- In addition to knowledge and attitude questionnaires, multiple studies used additional food safety indicators to determine intervention effectiveness. Environmental microbiological testing was also utilised to assess effectiveness of food safety improvement training interventions<sup>11,12</sup>.
- Furthermore, 30% of reviewed studies used a mixed methods approach to evaluate intervention effectiveness. Triangulation of approaches using such mixed methods to determine aspects of FSC and intervention delivery is reported to strengthen the validity of approaches<sup>19</sup>.
- Research has also shown that to truly evaluate intervention effectiveness, control groups should be utilised for comparison<sup>13</sup>; however, control groups were only utilised within 21% of studies reviewed.

### Food Safety Culture

Interventions identified from the studies have been coded according to the Culture Excellence FSC categories and dimensions<sup>18</sup>. Findings indicated that interventions were predominantly associated with the "People" category (training: 32%, communication: 30%). Most food safety issues occur due to human intervention; therefore, it can be suggested that intervention strategies focussing on these FSC dimensions may be effective at enabling tangible improvements.

## Significance

- There is a need to develop and evaluate targeted food safety interventions that address specific cognitive and behavioural factors that influence FSC within food manufacturing businesses.
- Intervention effectiveness evaluation may benefit from a mixed-method approach, combining questionnaires for cognitive-based improvements and objective evidence for behaviour-based improvements.

## References

For access to a full reference list, please scan the QR code.

