Meal-kits have grown in popularity over the last decade, prompting a healthier, less wasteful and more convenient alternative. Subsequent to meal kit delivery to consumer homes, step-by-step recipe cards and ingredients are provided for domestic meal preparation (see Figure 1).\(^1\)\(^2\)\(^3\)

Given the association of the domestic kitchen with the sporadic incidence of foodborne illness\(^4\), this current consumer trend may present unique food safety challenges, offering distinctive opportunities to inform and enable consumers to implement important food safety practices to reduce the risk of foodborne illness associated with food prepared in the home.

Research suggests that the inclusion of food-safety information in recipes may improve consumer food-safety practices\(^5\). However, little is currently known regarding the provision, understanding and use of food-safety information in meal-kit recipe cards and on meal-kit providers’ websites.

This study aimed to review recipe cards and websites of UK-based meal-kit providers to determine the inclusion of food-safety information.

### Methods

- **Members of the public,** from the UK, were invited via social media platforms to share images of meal-kit recipe cards from the last 12 months via email and picture messaging.
- **Market research** identified thirteen meal-kit provider websites for content analysis to determine the provision of food-safety information through Qualitative analysis.
- An online database was developed using a framework from the Partnership for food-safety Education (PFSE) ‘Safe Recipe Style Guide’ to enable a content analysis of recipe cards and websites (see Figure 2).\(^6\)
- A pilot study was carried out using recipe cards (n=18) to assess the reliability and validity of the electronic database tool for data collection.
- Ethical approval was obtained from the Cardiff School of Health and Sport Sciences (Ethics Approval Reference Number PGR-5421).

The Partnership for food-safety Education (PFSE) produced a valuable tool ‘Safe Recipe Style Guide’ with food-safety experts and recipe writers to improve the incorporation of food-safety communication in recipes with practices highlighted relating to temperature, handwashing, cross-contamination and production\(^6\).\(^7\) (see Figure 2.)

Recommended food safety practices aid in reducing the risk of foodborne illness by helping to eliminate the spread, slow the growth, and avoid the consumption of harmful bacteria\(^8\).\(^9\).

### Results

#### Temperature

- **Statements on the recipe cards regarding the cooking adequacy of high-risk foods** (n=1306) included subjective cooking indicators with 35% relating to the visual assessment of colour (see Figure 3) and 26% referring to cooking duration.
- There was one best practice statement for ensuring a meat thermometer to determine cooking adequacy.
- There were two recommendations for cooking to an internal temperature of 75°C. The provider subsequently expanded why this practice is important (see Figure 4).

#### Handwashing

- **Although 46% of recipes referred to handwashing at the start of recipe preparation,** these stated ‘wash hands’ with no further advice regarding hand hygiene such as the use of soap or drying.
- **48% of recipe cards did not refer to handwashing during recipe preparation.**
- **When statements regarding handwashing were included,** the information was located within the recipes’ cooking instructions (n=109) in a separate section adjacent to the recipe (n=162).
- **When the handwashing statement was located within the recipe instructions (n=104),** it was highlighted with an ‘important’ disclaimer with different text formatting distinguishing it from the rest of the recipe instructions (see Figure 7).

#### Cross-Contamination

- **When applicable** (n=346), cross-contamination prevention advice was present in 51% of recipes.
- **The most frequently included advice** (47%) was ‘wash equipment in-between uses’ (see Figure 8).
- **There was no advice to reduce the risk of cross-contamination after handling ingredients such as raw meat and poultry in 49% of recipe cards.**
- **Advice relating to ‘not washing meat’** was included in 36% of recipe cards, with this advice being found in a separate section adjacent to the recipe instructions. However, there was no further advice on why ‘this practice is important.’

#### Refrigeration

- **Of the applicable recipes** (n=332), 50% referred to storing ingredients in the fridge, but only one recipe (0.3%) referred to recommended temperatures (≤5°C) (see Figure 5).
- **Most of the refrigeration storage advice (47%)** was found on the back of the recipe card, adjacent to the recipe instructions (see Figure 6).

### Significance of study

- **Although all meal-kit providers provided some form of food-safety-related information in reviewed recipes,** the information was often not deemed sufficient to enable consumers to ensure food-safety in the domestic setting. There is a need to understand how consumers engage with such information with further exploration required through observational research to understand the optimum positioning and messaging of communicated food-safety advice on recipe cards.
- Occasionally, some form of food-safety advice could be found on the meal-kit providers’ websites but was also found to be insufficient. It is currently unclear if consumers engage with the websites for the purpose of seeking out food-safety information. There is an opportunity to explore how consumers engage with such information through Qualitative Consumer research to determine consumer engagement with the websites.

---

**Figure 1**: Example of meal-kit recipe box content and recipe card.

**Figure 2**: ‘Safe Recipe Style Guide’ can be used to cookbook authors, chefs, home cooks, and meal-kit providers who are interested in increasing the food-safety awareness of their clients.

**Figure 3**: Subjective indicator of doneness found on recipe cards.

**Figure 4**: The food ‘recipes’ need a cooked meat link in the refrigerator.

**Figure 5**: Subjective indicator of doneness found on recipe cards.

**Figure 6**: The food ‘recipes’ need a cooked meat link in the refrigerator.

**Figure 7**: Handwashing advice observed within the recipe instructions.

**Figure 8**: Advice related to the prevention of cross-contamination.