

# Meal Kits in the US: Is Food Safety Appropriately Communicated?

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## BACKGROUND

The Centers for Disease Control estimates that one in six Americans contract foodborne illnesses each year.<sup>1</sup> While many Americans associate foodborne illness with foods prepared in restaurants,<sup>2</sup> improper food handling at home can increase the risk of contracting a foodborne illness. Meal kit delivery services are gaining in popularity. While this innovation has the potential to improve cooking skills and may lead to healthier food choices, the food safety ramifications remain to be seen. It is unknown what kind of food safety messaging and risk communication is included in recipes that frequently contain raw ingredients.



## PURPOSE

The objective of this study was to evaluate the presence and quality of food safety instructions and prompts included in meal kits sold in the United States.

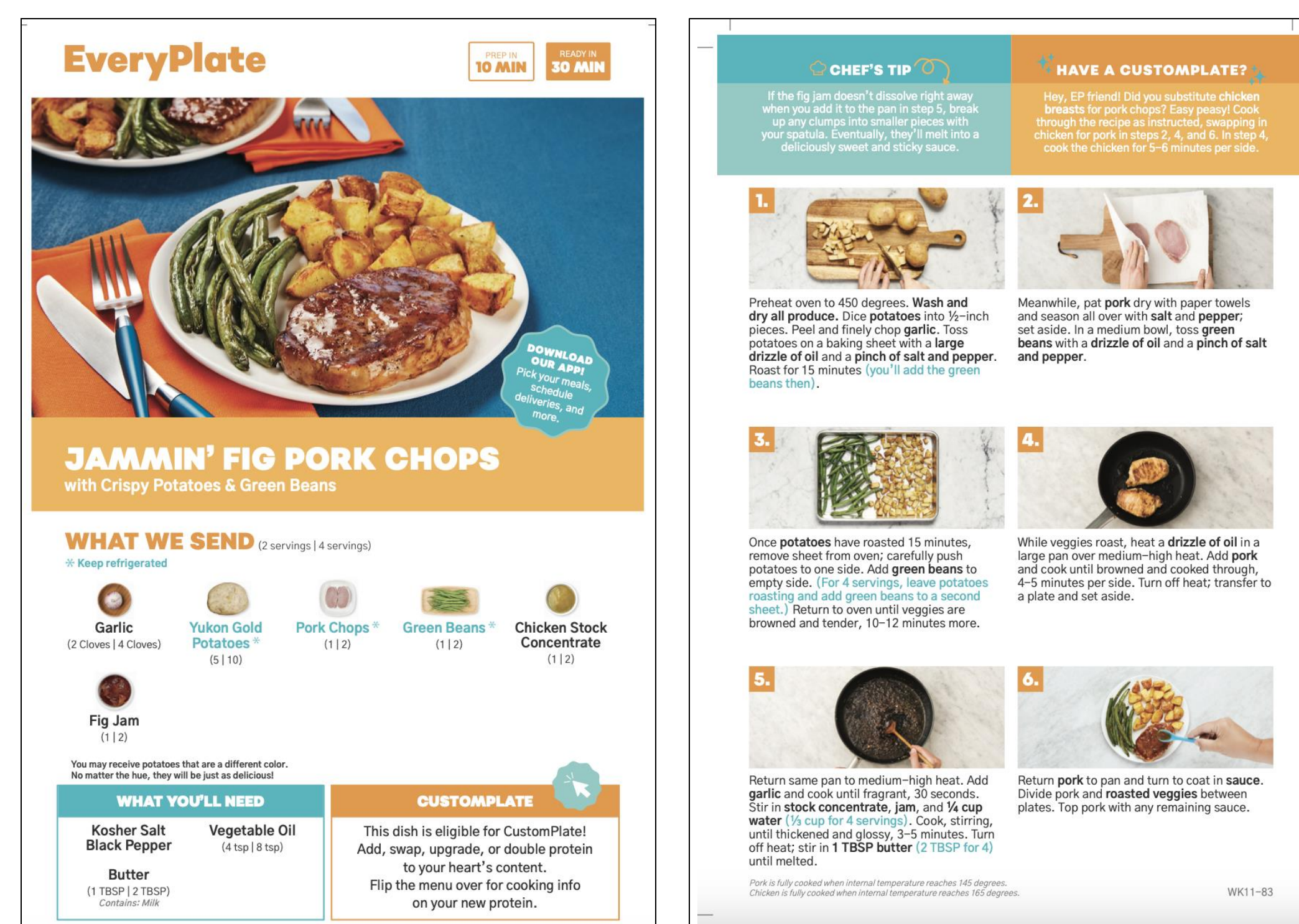


Figure 1 Sample Recipe Card

## METHODS

Recipe cards (n=126) were collected from commercial meal kit suppliers in the US (n=11). A data extraction tool was designed (Qualtrics, January 2023) to capture all food safety information integrated into the recipes via visual or textual means. The food safety information was organized into ten segments: chilled storage, thawing, marinating, washing produce, hand hygiene before recipe preparation, hand hygiene during recipe preparation, cross-contamination, cooking adequacy, leftovers, and general food safety practices.

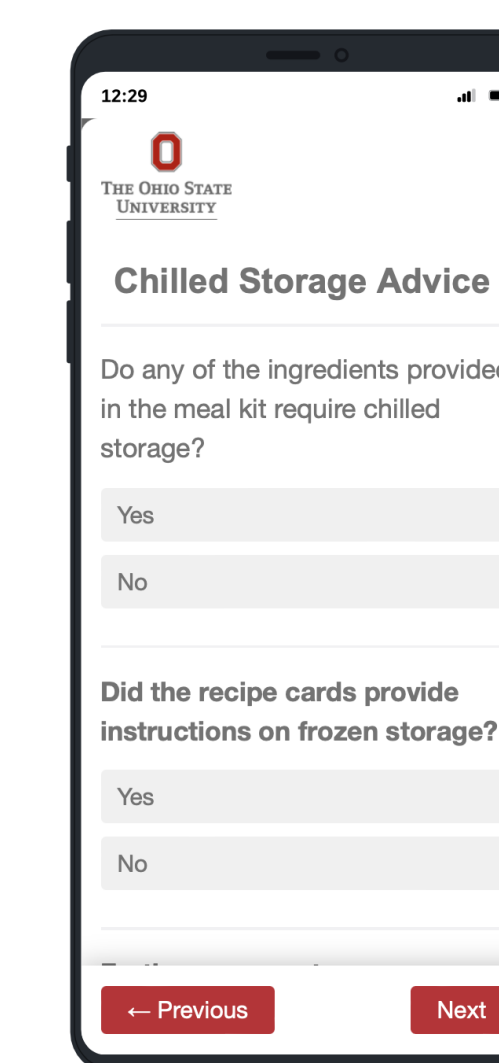


Figure 2 Qualtrics Data Extraction Tool

Table 1 Meal Kit Providers

Provider	Recipe Cards (n)	Recipe Cards (%)
Blue Apron	5	4.0
Dinnerly	9	7.1
EveryPlate	13	10.3
Green Chef	10	7.9
Hello Fresh	34	27.0
Martha Stewart and Marley Spoon	10	7.9
One Potato	10	7.9
Purple Carrot	10	7.9
Safer Plate	10	7.9
Sunbasket	10	7.9

## RESULTS

Of the recipe cards examined:

- **No** recipes included instructions on handwashing prior to preparation
- Each recipe featured at least one ingredient requiring chilled storage, yet the majority (n=111, 88.1%) did not include refrigeration advice or instruction on storage temperature
- Nearly one-fifth (n=24, 19.2%) of produce-containing recipes did not include advice on washing produce
- Only 5.6% (n=7) included handwashing advice after handling high-risk ingredients
- Of the 103 recipes containing raw protein, almost one-half (n= 43, 44.7%) provided no minimum internal temperature to ensure cooking adequacy
  - 2.9% (n=3) provided an incorrect minimum internal temperature
- Approximately one-half of recipes containing raw protein (48%, n=49) included instruction to pat raw meat dry with paper towels without additional instruction to reduce cross-contamination risk
- 2.9% (n=3) of recipes containing raw protein included instruction to rinse raw protein

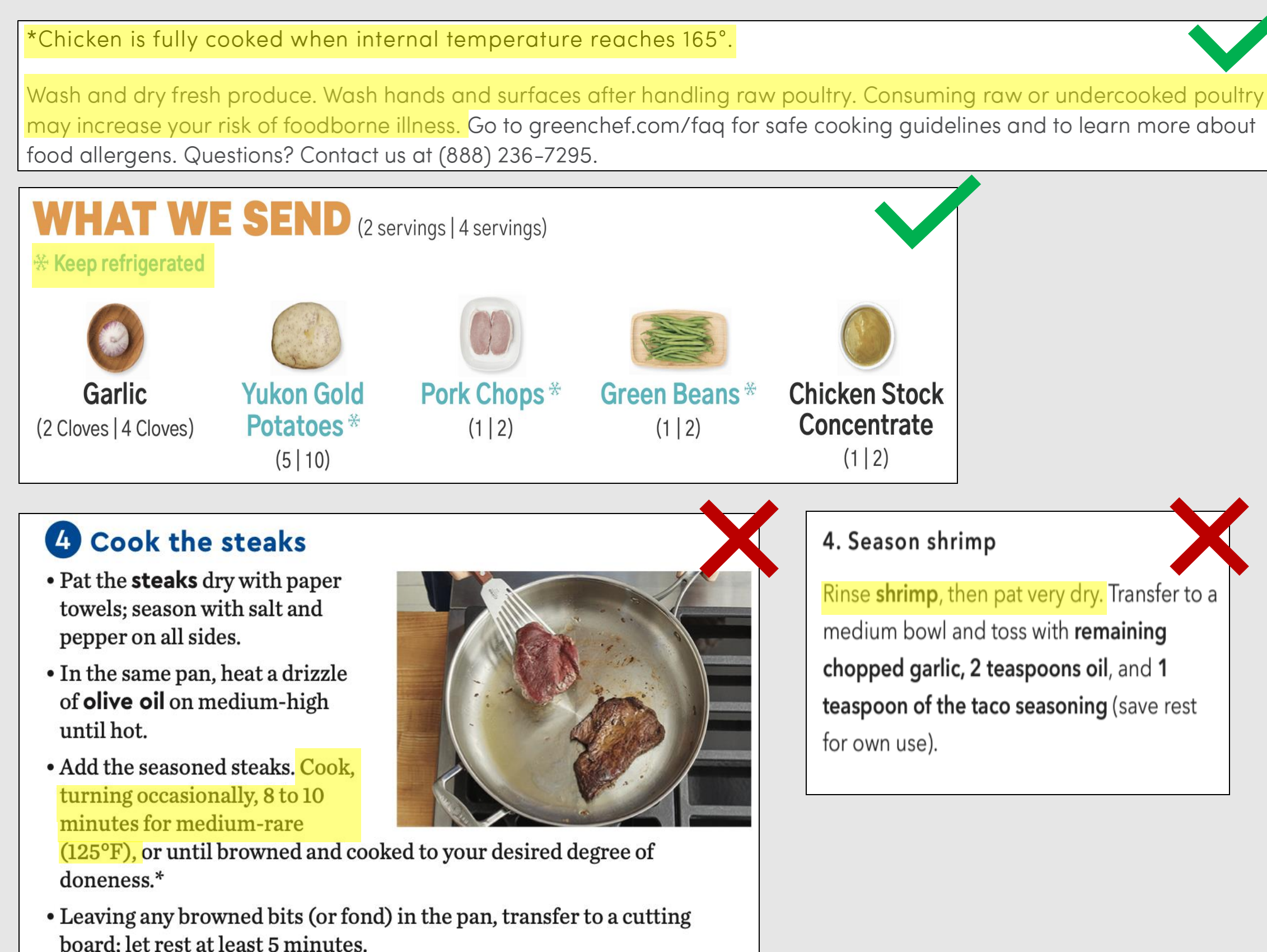


Figure 3 - 7 Examples of food safety advice included in recipe cards

Table 2. Food safety content of examined recipe cards

	Recipe Cards (n=126)	Recipe Cards (%)
Chilled Storage		
Ingredients requiring chilled storage	126	100.0
Provide advice (no temperature)	15	11.9
Provide advice (with temperature)	0	0.0
No chilled storage advice	111	88.1
Produce Washing		
Include fresh produce	125	99.2
Produce/herbs to be consumed raw	74	59.2
Advice to wash fruits and vegetables	102	81.6
Advice to wash herbs	24	19.2
Handwashing Before		
Recommend handwashing before preparation	0	0.0
Recommend hand drying	0	0.0
Advice not given	126	0.0
Handwashing During		
Recommend handwashing during preparation	7	5.6
Recommend hand drying	0	0.0
Advice not given	119	94.4

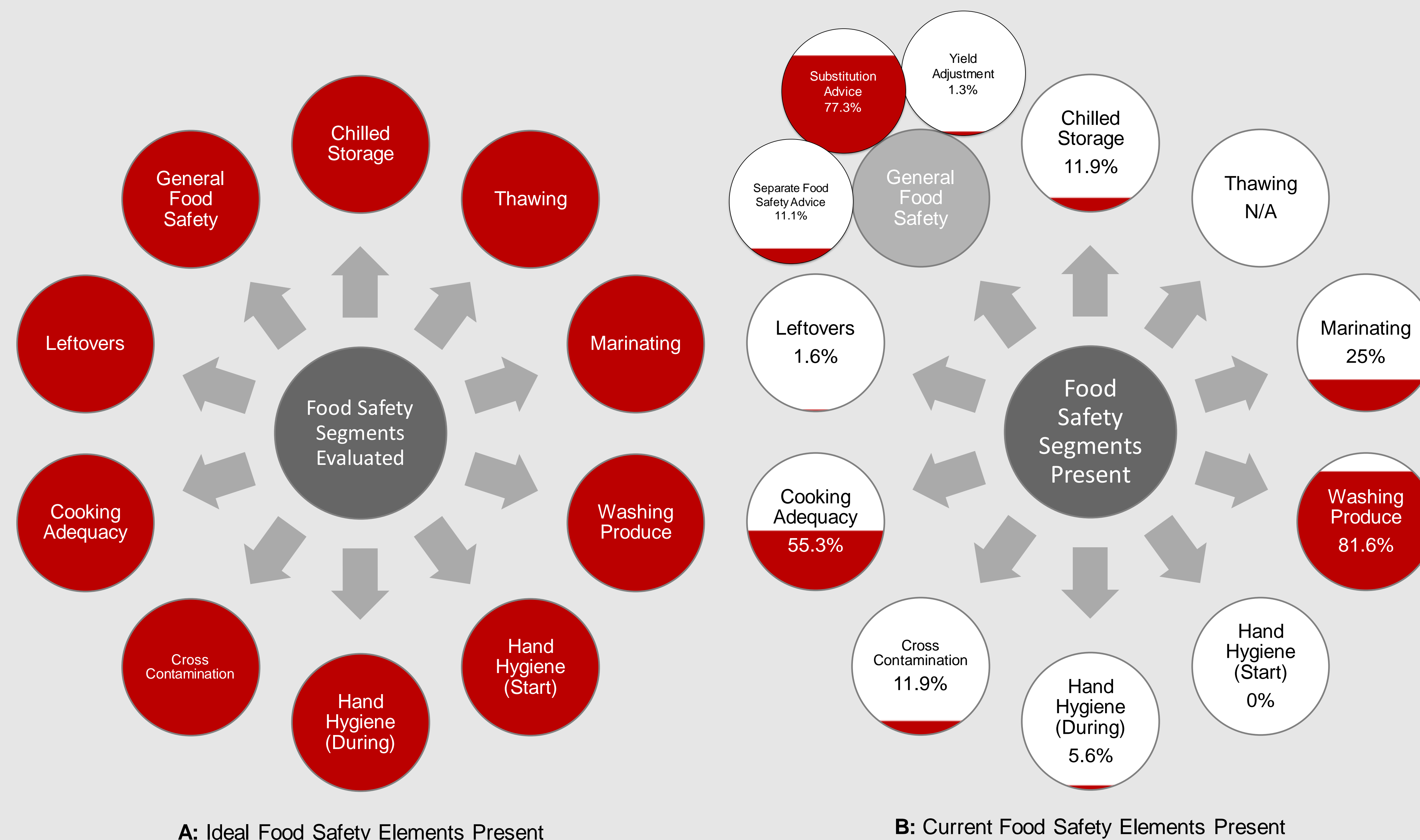


Figure 8 Food safety advice included in meal kit recipe cards (B) in the US compared to food safety best practices (A). Red signifies information was present in the percentage of applicable cards indicated within each circle.

When compared to best practices, the meal kit recipe cards evaluated in this study were lacking in all segments examined. Specifically, chilled storage advice was included by one meal kit provider, however, no temperature was stated. While 102 cards included instructions to wash produce, appropriate washing methods were not specified. Handwashing advice before recipe preparation was omitted in all recipe cards. Only seven recipe cards contained handwashing advice after handling raw ingredients. Advice for safely storing leftovers was included in only two recipes, though leftovers are possible with any recipe prepared. General food safety advice was divided into three categories examining instructions for ingredient substitution (e.g., differences in minimum internal temperature for different protein sources), yield adjustment (e.g., increased cooking time for two versus four servings), and reference to food safety advice available elsewhere (e.g., link or statement referring to provider website for further information). While most cards featuring substituted ingredients listed the correct temperature for all protein sources included, other general food safety practices were often not included. Three recipes included instructions to rinse raw protein. 49 cards included instruction to pat raw protein dry with paper towels without providing further advice to minimize cross-contamination risk.

## SIGNIFICANCE

Our research shows that food safety information is currently either lacking from the meal kits or suggests practices that can increase food safety risks in domestic kitchens, specifically regarding proper storage temperature, fresh produce handling, hand hygiene, cross-contamination, cooking adequacy, and leftover management. This gap increases the risk of foodborne illness for all meal kit consumers and may pose a severe hazard for individuals with health conditions that make them more susceptible to foodborne illness. Additional research is needed to design recommendations for future improved meal kit food safety instructions.