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## Food Safety Posters for Safe Handling of Leafy Greens

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## Food Safety Posters for Safe Handling of Leafy Greens

### Abstract

This article describes food safety educational tools depicting safe handling of leafy greens that are available as downloadable posters to Extension educators and practitioners ([www.extension.iastate.edu](http://www.extension.iastate.edu)). Nine visual-based minimal-text colored posters in English, Chinese, and Spanish were developed for use when formally or informally educating foodservice workers about safely handling leafy greens. A three-phase methodology included the use of expert knowledge, microbial sampling, and observational study in Iowa and Kansas foodservice operations. Use of the posters was shown to have positive impacts on both microbial levels and food safety behaviors, suggesting that the posters can be useful tools for Extension personnel.

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## Introduction

### Safe Handling of Leafy Greens

Leafy greens have been implicated in a large number of foodborne illness outbreaks. The Centers for Disease Control and Prevention found that 46% of reported foodborne illnesses were linked to fresh produce and nuts, with 22% linked to leafy greens (Painter et al., 2013). Contamination of leafy greens can happen at any point from farm to fork, at home, or in foodservice. With almost half of every American food dollar spent on food prepared away from home (U.S. Department of

Agriculture, Economic Research Service, 2014) and 44.8% of dark leafy vegetable and lettuce consumption taking place away from home (U.S. Department of Agriculture, Economic Research Service, 2014), it is important that those working in retail food establishments understand safe handling of fresh leafy greens.

## Use of Visual-Based Tools for Food Safety Training

Increases in immigration and globalization have increased ethnic diversity in the United States. This diversity can be seen in the general population and in the restaurant industry, which employs more minorities than any other industry (National Restaurant Association, 2012). A diverse workforce results in variations in food handling attitudes, behaviors, and practices that can impact food safety. Diversity in the workforce also may be exhibited in differences in literacy levels. Further, generational differences in the workforce, resulting from the influx of Generations X and Y, have led to the need for innovative and quick learning strategies (Kutner, Greenberg, Jin, & Paulsen, 2006). Consistent communication of messages and provision of resources and tools to workers by foodservice managers and supervisors are critical components for safe food handling practices to occur in the workplace (Arendt & Sneed, 2008; Ellis, Arendt, Strohbehn, Meyer, & Paez, 2010; Roberts, Arendt, Strohbehn, Ellis, & Paez, 2012). Use of minimal-text visuals helps convey critical food safety messages to Spanish-speaking workers (Justen, Haynes, VanDerZanden, & Grudens-Schuck, 2011; Rajagopal, 2012, 2013; Rajagopal & Strohbehn, 2011). Use of passively delivered educational intervention has been successful in improving food safety knowledge among restaurant food handlers (Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010; Dworkin, Panchal, & Liu, 2012).

## Methods

A university's Institutional Review Board for Human Subjects Research approved the study described herein, which employed a three-phase design to develop and assess the effectiveness of food safety messaging on leafy greens handling practices in retail foodservice establishments in Iowa and Kansas.

### Phase One

Observational data (based on observations of both employees and operations), microbial data (relevant to both leafy greens and contact surfaces), and interview data were collected and analyzed from a convenience sample of foodservice operations ( $n = 8$ ). Validated assessment forms (Sneed, Strohbehn, & Gilmore, 2004; Strohbehn, Sneed, Paez, & Meyer, 2008) were used to record data about operational aspects (e.g., food safety messaging, food handling procedures, and facilities and equipment) and employee behavior when preparing leafy greens. An interview guide was developed and used to interview employees ( $n = 16$ ) about their observed food handling behaviors.

### Phase Two

Visual-based minimal-text food safety messaging posters (intervention) were developed and evaluated by (a) a panel with expertise in food safety and/or foodservice operations ( $n = 5$ ), (b)

foodservice workers ( $n = 8$ ), (c) foodservice managers ( $n = 4$ ), and (d) undergraduate students ( $n = 120$ ). Feedback obtained from the evaluators was used to improve the posters prior to dissemination to each of the participating sites. See Figure 1 for examples of the posters.

**Figure 1.**

Examples of Visual-Based Tools Developed for Safe Handling of Leafy Greens



## Phase Three

The effectiveness of the intervention (i.e., food safety messaging poster implementation) was assessed by collecting observational data, microbial data, and interview data during postintervention visits at 1 and 3 months. Comparisons were made between preintervention (phase one) data and postintervention (phase three) data to assess effectiveness of the food safety messaging intervention.

## Results

The following posters were developed:

- My Health Is In Your Hands
- Food Safety Is In MY Hands
- I Won't Cross-Contaminate By Doing This
- The Yuck Stops Here!
- Prevent Cross-Contamination: Keep Hands Clean! Do Not Touch
- I Make The Difference! Whole Leafy Greens
- Whole Leafy Greens: Dos and Don'ts
- I Make the Difference! Bagged Leafy Greens

- Bagged Leafy Greens: Dos and Don'ts

Microbial analyses of leafy greens and leafy greens contact surfaces after implementation of the posters in foodservice establishments showed decreases in microbial loads on leafy greens and leafy greens contact surfaces (Roy et al., 2015). Abdelmassih et al. (2015) suggested that these posters can have a positive effect on safe handling of leafy greens but noted that commitment from management is required to make foodservice workers part of the decision-making process when developing food safety messages and identifying locations for posting. That research team further acknowledged that no single method of training can improve food handling behaviors. The study reported here provides further support that the use of multiple training methods, both formal (e.g., lecture) and informal (e.g., displaying posters in strategic locations in the foodservice establishment), influences safe handling of leafy greens.

## Summary

Evaluation of the effectiveness of the posters on improving safe handling of leafy greens in foodservice establishments showed improvements in leafy greens handling practices and reduction in microbial loads. The posters can be used by Extension educators in training foodservice entrepreneurs and their staff, as well as consumers, about safely handling leafy greens. The posters can improve outreach efforts to include community stakeholders from diverse backgrounds.

Further, Extension educators can connect with college and university instructors to make them aware of these tools as a resource for their classrooms, thus reaching future generations of the foodservice workforce. Education on safe handling of leafy greens can help mitigate the incidence of foodborne illness and deaths; availability of tools to improve learning among diverse audiences about safe handling of leafy greens can further lower risk of product contamination.

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