

## **Visual-Based Minimal-Text Food Safety Training Tools for Chinese-Speaking Food Service Workers**

### **Abstract**

This article describes visual-based minimal-text food safety tools developed in Mandarin Chinese to educate Chinese-speaking food service workers about safe food handling practices. Ten posters and one PowerPoint presentation were developed, and their efficacy in conveying critical food safety messages was tested with Chinese-speaking food service workers in Iowa. Extension educators can use these tools for formal and informal food safety education, thereby contributing to protecting public health.

**Keywords:** [Chinese](#), [food service](#), [food safety](#), [training tools](#)

**Lakshman Rajagopal**  
Associate Professor  
Iowa State University  
Ames, Iowa  
[lraj@iastate.edu](mailto:lraj@iastate.edu)

**Joel Reynolds**  
Assistant Professor  
Niagara University  
Niagara University,  
New York  
[jreynolds@niagara.edu](mailto:jreynolds@niagara.edu)  
[u](#)

**Dawei Li**  
Master's Student  
Iowa State University  
Ames, Iowa  
[daweil@iastate.edu](mailto:daweil@iastate.edu)

## **Introduction**

### **Food Handling in Chinese Restaurants**

In addition to being a significant part of the U.S. economy, the restaurant industry also has a diverse workforce, employing more minority managers than any other industry. Additionally, the number of ethnic restaurants is on the rise, with the number of Asian-owned restaurants having increased by 60% in the past two decades (National Restaurant Association, 2018). Among ethnic cuisines, Chinese cuisine has been identified as the most preferred ethnic cuisine in the United States, followed by Mexican, Japanese, and Thai cuisines (Lee, Niode, Simonne, & Bruhn, 2012). With the increasing popularity of Chinese food among consumers, maintaining the safety of food served at Chinese restaurants is critical for preventing incidences of foodborne illness. Yet previous research has shown lower food safety handling compliance in ethnic restaurants as compared to nonethnic restaurants (Roberts, Kwon, Shanklin, Liu, & Yen, 2011). Additionally, Kwon, Roberts, Shanklin, Liu, and Yen (2010) found restaurant inspection scores to be lower for ethnic-owned restaurants than nonethnic restaurants, a finding that has been corroborated by other researchers (Harris, Murphy, DiPietro, & Rivera, 2015).

### **Use of Visual Tools for Food Safety Education**

It has become essential to develop food safety training and education programs tailored to the needs of a diverse food service workforce. Arendt, Ellis, Strohbehn, and Paez (2011) found inconsistent or unclear messages to be a major barrier keeping workers from practicing food safety. Language barriers also are a major impediment to workers' understanding and practicing food safety (Rudder, 2006). One method for improving food safety training is to use visual-based minimal-text materials when training minorities for whom English is not their first language. Panchal, Liu, and Dworkin (2012) emphasized the need for targeted food safety educational materials in multiple languages to address language barriers. Appropriate translation and visual aids help workers overcome language barriers and relay critical food safety messages in short and more easily understood ways. The combination of visual-based training and hands-on activities was found to be effective in training Spanish-speaking food service workers about safe food handling practices, resulting in significantly improved food safety knowledge scores (Rajagopal, 2012, 2013; Rajagopal, Arendt, Shaw, Strohbehn, & Sauer, 2016). Liu and Kwon (2013) found that Chinese food service managers preferred to receive food safety training via materials translated into Chinese. Therefore, we undertook a process to develop and test food safety training materials for use with Chinese-speaking food service workers. Here, we describe the process, provide evidence of the efficacy of the materials, and make suggestions regarding their use by others in Extension.

## **Development and Testing of the Tools**

We used a two-phase approach to develop visual-based minimal-text food safety training materials and test their effectiveness on food safety knowledge and attitudes of Chinese-speaking food service workers in independently owned Chinese restaurants.

### **Phase One**

We modified previously developed visual-based minimal-text food safety training materials (Rajagopal 2012, 2013; Rajagopal et al., 2016; U.S. Department of Agriculture, 2016) to reflect the U.S. Food and Drug Administration's 2009 Food Code and subsequent 2011 supplement. The training materials were developed in English and reviewed by three experts in food safety and food service operations for content, construct, and face validity. The training materials were then translated into Mandarin Chinese and then translated back into English for accuracy and readability.

The training materials included handouts and a PowerPoint presentation specifically focusing on educating Chinese-speaking food service workers about preventing the top five risk factors that contribute to foodborne illness (U.S. Food and Drug Administration, 2013): poor personal hygiene, improper time-temperature control, cross-contamination, contaminated equipment and surfaces, and purchase of food from unsafe sources. We also developed training materials about food allergies and allergen handling. We used the concept of the "flow of food" (i.e., purchasing to storage to preparation to service) as the framework for identifying areas for which food safety training materials were needed.

### **Phase Two**

To assess the impact of the training materials on food safety knowledge, we conducted pilot testing with Chinese-speaking food service workers ( $n = 56$ ) whose native language was Mandarin Chinese and who worked in independently owned Chinese restaurants in Iowa, using a 30-question retrospective "post-then-

## **Evidence of Efficacy**

We created visual-based minimal-text training materials comprising 10 handouts and one PowerPoint presentation. Themes of the handouts included glove use (Figure 1); the concepts of cleaning, separating, cooking, and chilling (Figure 2); hand hygiene (Figure 3); thermometer calibration/use (Figure 4); and cleaning and sanitizing of equipment and surfaces (Figure 5).

### **Figure 1.**

Food Safety Educational Tool in English and Chinese: Glove Use

**I'm Gloving It!**  
A Guide to  
Glove Use in  
Foodservice  
Establishments  
IOWA STATE UNIVERSITY  
Extension and Outreach

**我要带手套!**  
在食品服务机构中  
关于手套使用  
的指导  
IOWA STATE UNIVERSITY  
Extension and Outreach

**I'm Gloving It!**

**Why wear gloves?**  
• Gloves provide a barrier between germs on hands and food

**When do I wear gloves?**  
• When handling different types of foods  
• When handling Ready-To-Eat foods, such as bread or cookies

**When do I change gloves?**  
• When gloves are ripped or torn  
• After touching any new surface  
• After touching face or hair  
• After coughing or sneezing into gloves  
• After four hours if working on the same task

**How are gloves worn?**  
• On clean hands - Wash hands with soap and water  
• Dry hands with clean paper towel

**我要带手套!**

**为什么戴手套?**  
• 手套提供了一个在手上的细菌和食物之间的屏障

**什么时候戴手套?**  
• 当处理不同类型的食物时  
• 当触碰可以直接食用的食物时

**什么时候换手套?**  
• 当手套被撕破或撕裂时  
• 在触碰其他物品表面后  
• 在同一项任务连续工作4小时后  
• 在咳嗽或打喷嚏到手套上后

**如何戴手套?**  
• 戴在洁净的手上 - 用肥皂与温水洗净  
• 用干净的纸巾擦干双手

Prepared by Lukshman Rajagopal, PhD, Hospitality Management Assistant Professor  
Reviewed by Catherine Strubbe, PhD, RD, CP-FS, HRM Extension Specialist. Designed by Patrick Herstein, PhD/Designer  
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**Safe Food**  
IOWA STATE UNIVERSITY.

Prepared by Lukshman Rajagopal, PhD, Hospitality Management Assistant Professor  
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**Figure 2.**

Food Safety Educational Tool in English and Chinese: Clean, Separate, Cook, Chill

**Clean.**  
Wash hands, utensils, and cutting boards before and after contact with raw meat, poultry, seafood, and eggs.

**清洗.**  
在触摸生肉、生蔬、海鲜、鸡蛋的前后要清洗双手、厨具、以及菜板。

**Separate.**  
Keep raw meat and poultry apart from foods that won't be cooked.

**分置.**  
将生肉、生蔬与即食食品分开放置。

**Cook.**  
Use a food thermometer - you can't tell food is cooked safely by how it looks.

**烹饪.**  
使用食物温度计-您不能根据的色泽来判断食物是否做熟了。

**Chill.**  
Chill leftovers and takeout foods within 2 hours and keep the fridge at 40 °F or below.

**冷却.**  
在2小时内冷却剩余食物和外带食物，放入温度在40°F (4°C)以下冰箱中。

Food handling safety risks at home are more common than most people think. The four easy lessons of Clean, Separate, Cook, and Chill can help prevent harmful bacteria from making your family sick. To find out more about food safety, visit [befoodsafegov](http://befoodsafegov). Questions? Click on Ask Karen or call 1-888-MPHotline.

在家中的食品操作的风险比人们想象中更常见。四个简单的教程清洗、分置、烹饪、冷却将帮助您预防有害的细菌对您家庭所造成的各种疾病。寻找更多食品安全信息请查看 [Befoodsafety.gov](http://Befoodsafety.gov) 如有疑问? 请咨询 Ask Karen 或致电 1-888-MPHotline.

**be food safe**  
From USDA and the Partnership for Food Safety Education

**be food safe**  
From USDA and the Partnership for Food Safety Education

Figure 3. Food Safety Educational Tool in English and Chinese: Hand Hygiene

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**Wash those hands! Here is how**

1. Wet hands with hot running water.
2. Apply soap.
3. Rub hands together for 10-15 seconds.
4. Clean under fingernails and between fingers.
5. Rinse hands thoroughly under running water.
6. Dry hands with disposable paper towel or hand dryer.

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**正确的洗手步骤**

1. 用温水润湿双手 100°F(38°C)
2. 涂抹肥皂
3. 揉搓10-15秒
4. 清洁指甲与指间
5. 冲洗
6. 用一次性纸巾擦干或风干机干双手

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Bare hand contact of ready to eat food is prohibited (Food Code 2005)

Before handling different types of foods

After touching anything that could contaminate hands

When handling lemons or tomatoes

After coughing or sneezing

After every four hours of working on the same task

**When to change gloves**

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裸手触碰即食食物在爱荷华州是被严格禁止的 (食品法 2005)

在操作其他食物之前

如果手套破损后

在触碰任何有可能污染食物的物品后

在触碰柠檬或者西红柿后

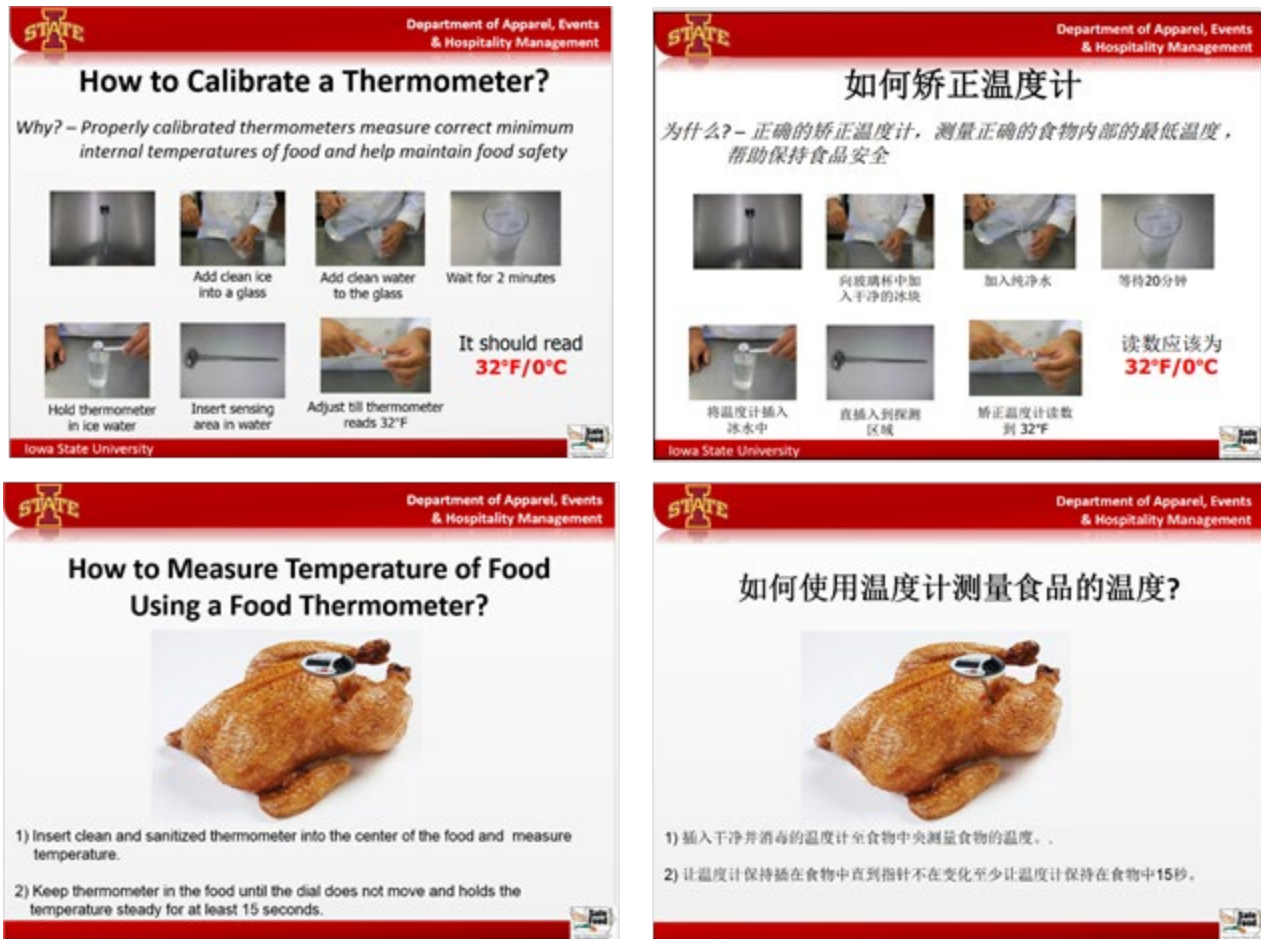
在咳嗽或打喷嚏后

在连续4小时忙于同一个工作后

**何时更换手套**

**Figure 4.**

Food Safety Educational Tool in English and Chinese: Thermometer Calibration/Use



**Figure 5.**

Food Safety Educational Tool in English and Chinese: Cleaning and Sanitizing



Use of the training materials improved total food safety knowledge scores by 52.1%, from 12.9±2.7 before the training to 29.0±1.0 after the training (see Table 1). Each correct answer was worth 1 point for a total possible food safety knowledge score of 30. Results of the testing of the materials indicated that the visual-based minimal-text training including the 10 handouts and the PowerPoint presentation was useful in improving food safety knowledge of Chinese-speaking food service workers.

**Table 1.**

Food Safety Knowledge Scores of Chinese-Speaking Food Service Workers (n = 56)

Knowledge topic	Number of items	Pretraining	Posttraining	Percent change	t
		M (SD)	M (SD)		
Introduction	5	3.17 (1.06)	4.66 (0.48)	+29.64%	10.45***
Purchasing and receiving	2	0.68 (0.47)	1.92 (0.25)	+62.50%	18.22***
Storing	3	0.68 (0.74)	2.70 (0.47)	+66.07%	18.09***
Thawing	2	0.66 (0.61)	1.86 (0.35)	+59.82%	14.55***
Preparing	2	0.41 (0.53)	1.88 (0.33)	+73.21%	18.20***
Holding	2	0.88 (0.72)	2.0 (0.00)	+56.25%	11.77***
Cooling	2	0.77 (0.76)	1.89 (0.37)	+56.25%	11.02***
Reheating	2	1.38 (0.56)	1.80 (0.40)	+21.43%	4.52***
Service	2	1.39 (0.62)	2.00 (0.00)	+30.36%	7.29***
Cleaning and sanitizing	2	0.55 (0.6)	1.93 (0.26)	+68.75%	16.60***
Pest management	2	0.66 (0.67)	2.00 (0.00)	+66.96%	15.00***
Labeling	2	0.86 (0.75)	1.93 (0.26)	+53.57%	10.91***
Food allergies	2	0.79 (0.62)	1.96 (0.19)	+58.92%	14.55***
Total	30	12.87 (2.72)	28.50 (1.01)	+52.08%	14.55***

Note. Total possible knowledge score = 30.

\*\*\* $p < .001$ .

## Summary

Overall, visual-based minimal-text food safety training was effective in training Chinese-speaking food service workers as observed by the increase in overall knowledge score. Extension educators and food safety trainers alike can use these Chinese-translated visual-based training materials (handouts and PowerPoint presentation) to help Chinese-speaking food service workers better understand food safety messages. The use of appropriately translated, visual-based materials can assist workers in overcoming language barriers and can relay critical food safety messages that are easily understandable. Copies of the educational tools can be obtained by emailing the primary author.

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