Executive Summary

The Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture (USDA) contracted with RTI International and its subcontractor North Carolina State University (NCSU) to conduct meal preparation experiments to evaluate consumer food handling behaviors in a test kitchen. The research team conducted five separate iterations of meal preparation experiments to address a specific consumer behavior and to determine the effectiveness of a behavior change intervention. The meal preparation experiments are part of a larger 5-year annual study that also includes focus groups (two iterations) and web surveys (two iterations). This report describes the results of the fifth iteration of the meal preparation experiment.

ES.1 Study Methods

RTI and NCSU conducted the study in a test kitchen facility located in Raleigh, North Carolina (Wake County), with three identical test kitchens. The study examined participants' adherence to recommended food safety practices when the mandated Safe Handling Instructions (SHI) label has been removed from meat packaging and safe handling instructions are integrated into the manufacturer's cooking instructions (MCI). Participants were randomly assigned to the (1) control group: separate SHI label and MCI on sausage packaging (n = 125) or (2) intervention group: intervention label with safe handling instructions integrated into the MCI (n = 126). For the outcomes of interest, we conducted statistical testing for the difference between the control versus the treatment group. Participants were observed (while being video-recorded) cooking breakfast sausage (inoculated with harmless traceable nonpathogenic *E. coli* strain DH5-Alpha) and shell eggs and preparing a fruit salad with cantaloupe. Participants' behaviors were coded to measure adherence to recommended food safety practices, including thermometer use, handwashing, cleaning and sanitizing, safely preparing shell eggs, and washing produce. Following meal preparation, the study team collected microbiological samples from surfaces and cantaloupe from the prepared fruit salad and analyzed the samples for prevalence and level of DH5-Alpha. Participants participated in a post-observation interview to collect information on their usual food preparation practices and response to the intervention label.

ES.2 Key Findings

The key findings from the study are summarized below.

Impact of Intervention Label

▪ The intervention label did not impact the rate of food thermometer use for the sausage, the rate of handwashing attempts (before or during meal preparation), or the rate of cleaning/sanitizing attempts for the surface used to prepare the sausage.

▪ The results of the microbiological analysis suggest that the intervention label did not have an impact on cross-contamination during meal preparation.

▪ When asked about thermometer use in the post-observation interviews, 40% of treatment group participants reported using a thermometer because of the instruction on the label compared with 16% of the control group (the control group label provided the endpoint temperature in the MCI but did not have instructions to use a food thermometer). These results suggest that the intervention label may have influenced thermometer use in the test kitchen, although the rates of thermometer use were not significantly different for the treatment and control groups.

▪ Most (59%) treatment group participants did not offer any suggestions for improving the intervention label; 79% said the length of the label was about right, and 20% believed it was too long.

Thermometer Use

▪ Fifty percent of the control group and 55% of the treatment group used a thermometer to check doneness of the sausage patties. The difference between the two groups was not statistically significant. Some participants reported that they used a thermometer in the test kitchen, although this is not their usual behavior when cooking at home.

▪ Among participants using a thermometer, the mean number of sausage patties checked for doneness was three (most participants cooked four patties) for each group.

▪ Among participants using a thermometer, most participants failed to insert the thermometer in the proper location when checking doneness of the sausage patties.

▪ Comparing thermometer use among control group participants for Years 1 through 5 of the study, thermometer use varied by the type of product cooked. Excluding the not-ready-to-eat frozen, breaded stuffed chicken breasts—given the different characteristics of this product—the rate of thermometer use was significantly higher for hamburgers (58%), bratwurst (55%), and breakfast sausage (50%) compared with turkey burgers (34%).

Handwashing

▪ Rates of handwashing attempts *before* meal preparation were similar for the two groups: 44% for the control group and 42% for the treatment group.

▪ Rates of handwashing attempts *during* meal preparation were similar for the two groups: 17% for the control group and 18% for the treatment group.

▪ As in Years 1 through 4, few handwashing attempts included all steps necessary to be considered an adequate handwashing event as defined by the Centers for Disease Control and Prevention's (CDC's) recommended steps, and the most documented reason for not successfully washing hands was failing to rub hands with soap for at least 20 seconds.

▪ For handwashing before meal preparation, the rate of attempting handwashing for Years 4 and 5 (44%) was significantly lower compared with rates observed for study

Year 2 (74%) and Year 3 (71%) among control group participants.[1] We speculate that the lower rate for Years 4 and 5 may be because participants used the hand sanitizer station upon arrival, which was not present in prior years, as a COVID-19 precaution. Other reasons are possible, such as differences in the characteristics of the study sample and social distancing measures during the participant introduction to the test kitchen, which led them to touch meal preparation surfaces (e.g., drawers/cabinets), thus commencing meal preparation before washing their hands. Additional analysis is needed to understand why the rates are different.

Cleaning and Sanitizing

▪ Attempts to clean and sanitize immediately after handling sausage were similar for the two groups (about one-third of participants), with over half of the attempts unsuccessful because the participant cleaned but did not sanitize the surface.

▪ At the end of meal preparation, 65% of control group participants and 58% of treatment group participants attempted cleaning and sanitizing; the difference was not statistically significant. The rate of successful attempts (cleaned and then sanitized) was around 70% for both groups.

Cross-contamination and Microbiological Analysis

▪ Across all participants, the most often contaminated surface was the kitchen basin (38% of participants). The rate of contamination for the cantaloupe was the next highest, at 25%.

▪ Rates of contamination were relatively low for the juice glasses used to plate the meal (9%), spice containers (5%), and the tablet (3%). No differences were observed by group for prevalence or level of contamination.

Preparing and Cooking Eggs

▪ Less than half (43%) of participants attempted to wash their hands after cracking eggs; of those, only 1% successfully did so according to CDC's recommended steps.

▪ Sixty-nine percent of participants who cooked scrambled eggs reported cooking them until the yolk was firm. Among participants who fried the eggs, only 20% cooked them until the yolk was firm, preferring instead for their eggs to be over easy or over medium, with the yolks still runny.

Washing Produce

▪ The rate of washing attempts for the cantaloupe among all participants was 25%; and among these, 75% were successful.

▪ The rate of washing attempts for the mint among all participants was 43%. Of these, only 29% rubbed the mint with their hands, the recommended practice.