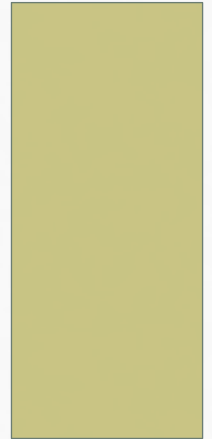


FOOD HANDLER KNOWLEDGE RETENTION

Retraining effectiveness in FOODSAFE
trained food handlers in BC, Canada



Presented by: Debby Peng – BCIT



OVERVIEW



- Background
- Purpose of study
 - Hypothesis
- Methods
 - Survey design + participant selection
- Results
 - Statistical analysis
- Study significance
- Future directions

BACKGROUND



- Educating and training food workers provides a foundation for safe food handling
 - In BC, a legislative requirement since 2000 (FPR Section 10)
 - FOODSAFE or its equivalency is used as an inspection criteria, and/or part of progressive enforcement by EHOs
 - FOODSAFE Level 1 is an 8 hr course; requires obtaining 70% on the exiting exam
 - Improved behaviors: hand washing, fewer time/temperature abuse, improved sanitation and less injuries
- Concerns with current FOODSAFE:
 - No expiration date – knowledge retention?
 - Periodic retraining? Retraining effectiveness? What kind of retraining?

PURPOSE OF STUDY

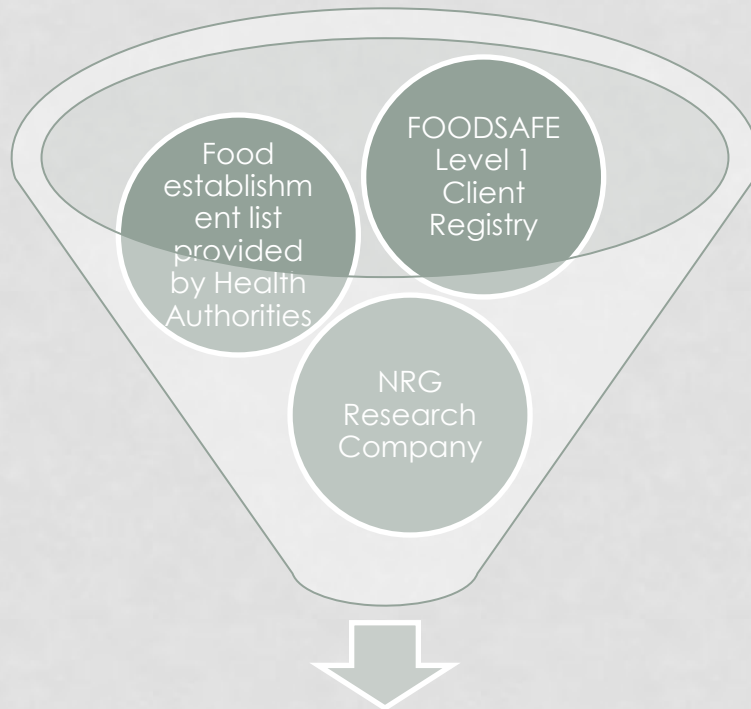


- BC CDC's FOODSAFE study
 - Phase 1*:
 - 2009, surveyed FS graduates and untrained food handlers:
 1. Knowledge retention declines significantly over time
 2. Workplace influences food safety knowledge and attitudes in workers
 3. Training benefits practices at home
 - Phase 2:
 - 2011 April-May
 - Apply intervention: invited food handlers for retraining
 - Phase 3:
 - 2012 Jan. – Feb., surveyed participants
 - Does retraining improve food safety knowledge retention?

→ Recommends periodic retraining

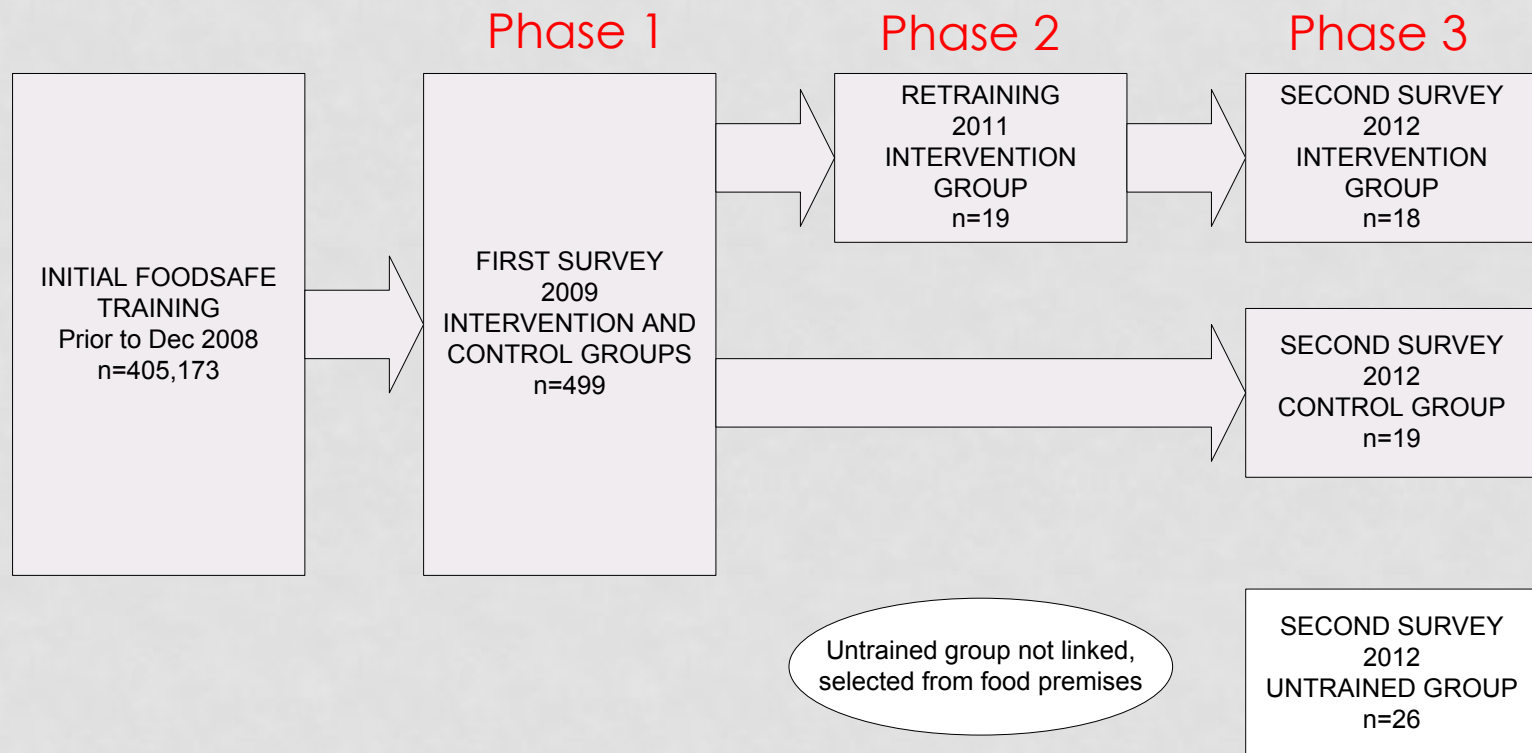
*McIntyre, L., Vallaster, L., Wilcott, L., Henderson, S. B., & Kosatsky, T. (2013). Evaluation of food safety knowledge, attitudes and self-reported hand washing practices in FOODSAFE trained and untrained food handlers in British Columbia, Canada. *Food Control*, 30(1), 150-156. doi: 10.1016/j.foodcont.2012.06.034

METHODS – PARTICIPANT SELECTION



- Exclusion criteria:
 - Age (born 1990 or later)
 - Non-English FOODSAFE course
 - Failed grade (an exam mark below 70%)
 - Not food service worker (self report student as occupation)
- Respondents are included in study when submit consent
- Free retraining offered to individuals that indicated interest; coffee cards as additional incentives
- Separate, unrelated group of untrained recruited directly from food premises

METHODS – PARTICIPANT SELECTION



METHODS – PARTICIPANT SELECTION



- 3 groups:

Intervention Group

- FOODSAFE trained
- Received retraining
- Food service workers

Control Group

- FOODSAFE trained
- Not retrained
- Food service workers

Untrained Group

- Not FOODSAFE trained
- Not retrained
- Food service workers

- Control Group takes consideration of knowledge gained from initial FOODSAFE training (1989-2008)
- Untrained group takes consideration of the food safety knowledge gained from working in the industry that is unrelated to FOODSAFE training (findings from phase 1 – workplace affects knowledge)

METHODS – SURVEY DESIGN



- Questions are close ended (multiple choice or Y/N), with “I don’t know” as an option – prevents erroneous responses from guessing
- Contains **13 knowledge questions** (selected from the larger survey used in phase 1)
 - Covers the basic principles of:
 - food storage,
 - cooking,
 - temperature control
 - thawing,
 - hot holding,
 - cleaning/sanitize food contact surfaces
 - Scored: Best answer is awarded 5 points and 2nd best answers are 2 points each (maximum of 65 points)
- ...and **2 general information questions** – confirm if English is 1st language, received previous training

METHODS – SURVEY DESIGN



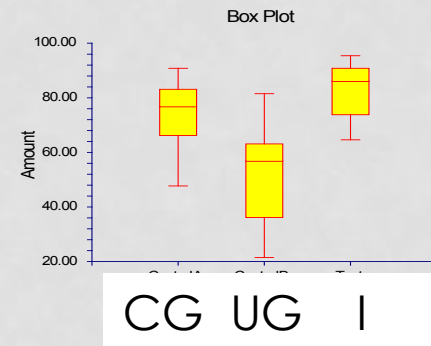
- Why telephone?
 - To be consistent with previous study phase
 - Maximize number of responses
 - Can't cheat!!
- But...
 - Interrupt respondent's routine – inattentiveness?
 - Cost and time higher than alternate survey delivery methods
- Telephone survey administered at 9-12 months after retraining is completed (3 yrs after initial survey)
 1. Compare survey score of retrained to control groups
 2. Compare survey score to before and after the retraining
 3. Time series analysis (Lorraine and Sarah)



RESULTS – HYPOTHESIS TESTING 1

- ANOVA test: distribution toward normality; the scores between groups are very significantly different ($p=0.000000$, power= 1.000000 , unlikely α , β)

Group No.	n	Average Score (%)	Median (Range)	Standard Deviation
Intervention	18	54.0 (83%)	56 (42-62)	8.5
Control Group	19	48.1 (74%)	50 (31-59)	13.6
Untrained Group	26	33.6 (51%)	37 (14-53)	16.6



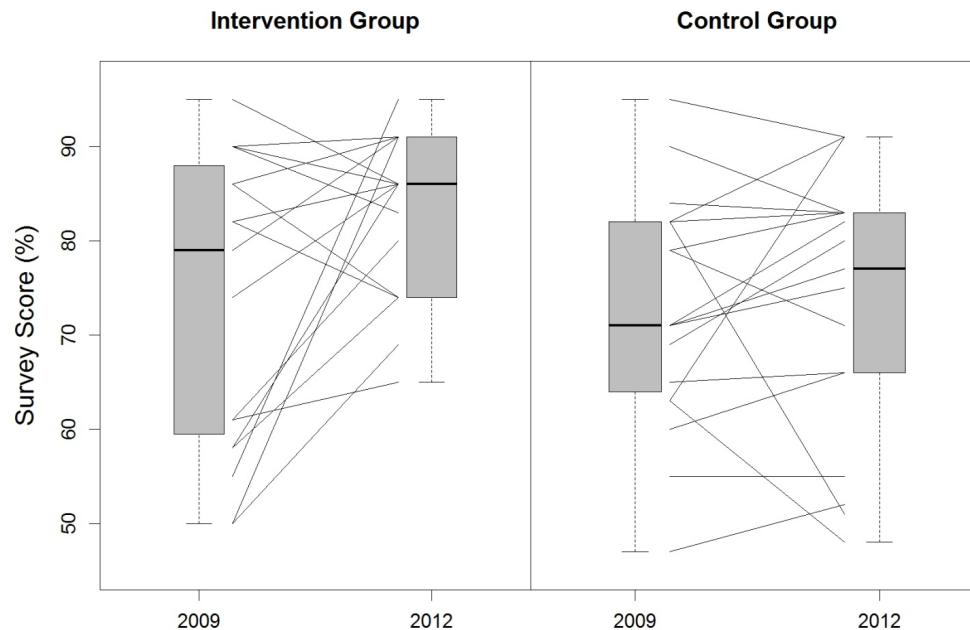
- Overall: Intervention > control > untrained
 - ie. Retrained workers scored best because food safety concepts are fresh, but FOODSAFE trained workers in general scored better than non-trained workers
- “Working knowledge” (70%) was achieved by both intervention and control groups

RESULTS – HYPOTHESIS TESTING 2

- Pairwise t-test of two survey result – before and after
 - Intervention group - significantly higher
($p=0.007$, power=0.83, unlikely α , possibly β)
 - Control Group – not much ($p=0.14$)
- I.e. It works - retraining does make a difference in knowledge retention - this is great!
 - Would be interesting in the future to explore difference between format of retraining (ex. web or classroom, length of program)...

RESULTS - HYPOTHESIS TESTING 3

	No .	Pooled food handler knowledge (%)		p-value (paired difference)
		2009 survey	2012 survey ¹	
Intervention	18	74.4	83.0 (A)	p=0.0188
Control	19	72.6	73.8 (B)	p=0.3252
Untrained	26		51.8 (C)	

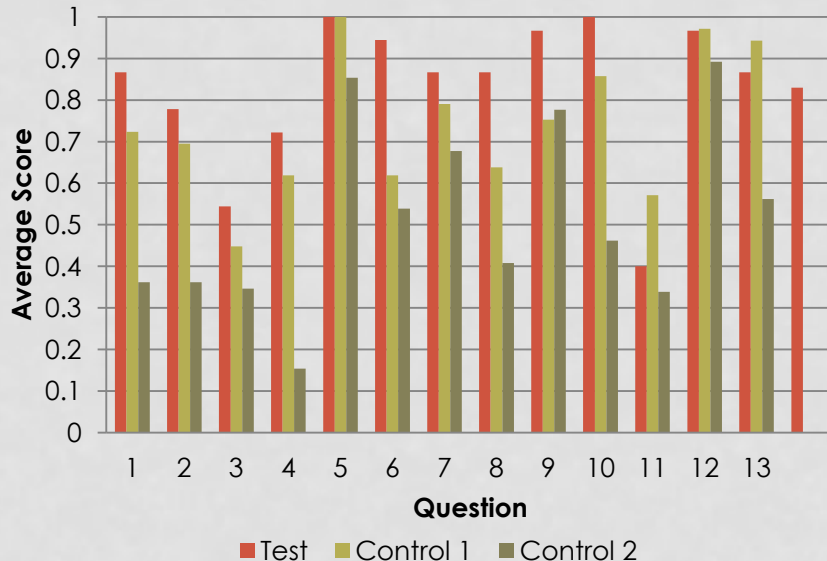


- Retraining was significant in increasing knowledge retention in the intervention group

*Lorraine McIntyre and Sarah Henderson for graphics

RESULTS – INDIVIDUAL QUESTIONS

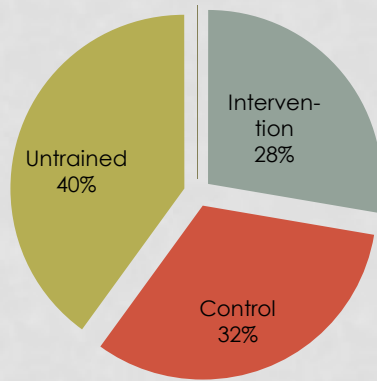
- Help identify challenging areas :
 - Best answered by all groups: Q5, Q12
 - Most poorly answered: Q 3, 4 and 11



Knowledge Question
1. What is the minimum safe temperature to hold hot foods?
2. When reheating leftovers, what minimum internal temperature should leftovers be reheated to before serving?
3. When cooling a cooked food that will be stored in the refrigerator, how long do you have to get it to the cold food storage temperature?
4. What is the safest way to cool a large pot of soup?
5. The correct way to determine the temperature of cooked food is to?
6. The "Danger Zone" refers to what range of temperature?
7. What is the best method to clean dishes?
8. To sanitize a food surface, like a cutting board, the correct amount of domestic bleach to water is?
9. Perishable foods must be refrigerated below 4 degrees Celsius or 40 degrees Fahrenheit to?
10. What is the recommended final internal temperature for cooking a stuffed turkey safely?
11. What is the recommended final internal temperature for cooking foods, for example, red meats like hamburger?
12. After you prepare a family dinner, how long do you generally leave the leftovers out on the counter?
13. What is the best way to thaw frozen foods, for example red meats like hamburger?

RESULTS - POPULATION

Surveyed Population



		No .	Pooled food handler knowledge (%)	p-value (χ2)
FOODSAFE Trained (intervention and control groups)				
English as first language?	Yes	27	79.7	p=0.293
	No	10	74.5	
Other food safety training?	Yes	5	78.8	p=0.820
	No	32	78.2	
Untrained Group				
English as first language?	Yes	13	54.2	p=0.411
	No	13	49.3	
Other food safety training?	Yes	10	51.2	p=0.831
	No	16	52.1	

*Lorraine McIntyre for graphics

- 60% reported English was not their first language
 - When pooled into trained and untrained: not significant
- 28% reported they have received prior training on food safety (that is not FOODSAFE) either in school or on the job
 - Not significant, ie. other trainings are just not effective?

LIMITATIONS

- Small sample size (n=18, 19, 26)
 - Affects the effectiveness of comparison between groups and the generalizability of the survey findings
 - Low recruitment and low participation rate from the food service establishment contacted
- Did not explore geographic/description data
 - Answered in the more extensive survey in previous phase

STUDY SIGNIFICANCE

1. FOODSAFE training is important!
 - FOODSAFE trained workers are better at recognizing proper food handling and food safety concepts than untrained workers who are simply exposed to the food service environment
2. Re-training is an effective method to improve food safety knowledge retention
3. Language barrier is an important consideration
 - Important to continue offer FOODSAFE in multiple languages
4. Other types of training require improvement
 - Potentially more specific and can enhances the FOODSAFE concepts and encourages knowledge retention

FUTURE DIRECTION



- Recertification in many places already:
 - California RETAIL FOOD CODE (Jan, 2011): Certified individuals shall be recertified every five years by passing an approved and accredited food safety certification examination.
 - Rhode Island Food Code: manager certification renewed every 3 years
- Revisions to the FOODSAFE course or potential change in regulation?
 - Decision to add date of certification/expiration to FOODSAFE certificates beginning in January 2013
- Increase opportunities for instructors/ change in EHO's priorities?
- Contributing realistically to decreasing food borne illnesses and ensuring the safety of food in BC!



QUESTIONS



Many thanks to:

- Lorraine McIntyre (BC CDC) for the opportunity to work on this project and continuous support throughout 😊