

**ANALYSIS OF SEAFOOD  
CONSUMER CHARACTERISTICS**

by

Elizabeth Schwenk, RD, LDN

A thesis submitted to the Faculty of the University of Delaware in partial  
fulfillment of the requirements for the degree of Master of Science in Human Nutrition

Fall 2009

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Elizabeth Schwenk, RD, LDN

Approved: \_\_\_\_\_  
Nancy Cotugna, DrPH, RD, LDN  
Professor in charge of thesis on behalf of the Advisory Committee

Approved: \_\_\_\_\_  
Susan J. Hall, PhD  
Chair of the Department of Health, Nutrition and Exercise Sciences

Approved: \_\_\_\_\_  
Kathleen S. Matt, PhD  
Dean of the College of Health Sciences

Approved: \_\_\_\_\_  
Debra H. Norris, MS  
Vice Provost for Graduate and Professional Education

## **ACKNOWLEDGMENTS**

First and foremost I would like to thank Dr. Nancy Cotugna, my thesis advisor and mentor. She has provided me with a tremendous amount of knowledge and guidance (and patience) throughout my entire graduate studies, and especially in this project. Thank you to Doris Hicks for all her help, being a member of my thesis committee and providing me with an interesting project. And I also owe many thanks to Dr. Lawrence Hotchkiss for the countless hours of guidance through the statistical analyses.

I am also very grateful for the emotional support and technical help from my husband, Peter. To my son Zakary, thank you for being so patient and understanding while I was in school. I enjoyed doing our homework together. Thank you to the rest of my wonderful family for all your love and assistance in getting ‘done’. I also truly appreciate the support from all my great friends.

My thanks to the NTDT faculty for providing me with a sound advanced knowledge base. Thank you to my fellow graduate students for their support and friendship.

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## **ABSTRACT**

**Background:** Seafood is an excellent source of essential omega-3 polyunsaturated fatty acids (PUFA) in the diet. The 2005 Dietary Guidelines for Americans (DGA) advocate the intake of two servings of fish per week noting a link with potential cardiovascular health benefits. Many health organizations, including American Heart Association and the American Dietetic Association, concur with this recommendation.

**Objective:** The purpose of this study was to advance our understanding of consumer perceptions and reasons for current decisions regarding seafood consumption. It is important to identify differences in characteristics of those who eat the recommended amount of seafood and those who do not, in order to promote seafood consumption to the population as a whole to meet the national recommendations.

**Design:** This secondary data analysis of a nationwide Internet survey compared current seafood eaters who consume the DGA recommended amounts (CSE-R) with those not meeting recommendations (CSE-NR), former seafood eaters (FSE) and non-seafood eaters (NSE), to further clarify the knowledge, attitudes and perceptions of consumers with regard to seafood.

Statistical analyses included cross tabulations of consumption groups with demographic variables and individual items found in questions on attitude, actual knowledge, self-reported knowledge (SRK), purchasing decisions, dining out and sources of seafood information. Factor analyses were performed on questions of attitude, actual knowledge, SRK, purchasing decisions and sources of seafood information. Indices from the factor analyses and demographic variables were used for linear regressions.

**Subjects:** The original survey was a nationwide Internet survey conducted from July 27, 2006 to August 7, 2006 with a total of 1062 respondents.

**Results:** Results indicated only 19.2% reported eating seafood in the recommended amount (CSE-R) while the majority (68.5%) of participants (CSE-NR) reported consuming some seafood but in inadequate amounts. Those in the CSE-R group tended to be older with more education. Results of my study indicated SRK to be the most significant factor in influencing seafood consumption in general. This factor included such things as seafood handling, preparation, quality and contaminants. However claiming to be ‘knowledgeable’ is a subjective measure and the perception of being knowledgeable is not necessarily an indication of a person’s actual knowledge. Variables of older age, a higher education level and the use of ‘professional or expert’ sources for seafood information were also related to seafood consumption.

**Conclusion:** In theory, if SRK could be equated to actual knowledge, then increasing the SRK of items in that variable could lead to an increase in people

meeting the DGA for seafood consumption. Future research will be needed to test the assumption that SRK is identifying and measuring actual knowledge. If this assumption proves correct then those items of SRK identified as being most important in consumers' purchasing decisions (seafood quality, safe handling, preparation and storage) should be the focus of future messages.

## **Chapter 1**

### **INTRODUCTION AND LITERATURE REVIEW**

#### **1.1 Background**

Seafood is an excellent source of the essential omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Fish species having a greater fat content, such as salmon and trout, are a major source of these long-chained polyunsaturated fatty acids (PUFA) in the diet (1-3). The 2005 Dietary Guidelines for Americans (DGA) advocates the intake of approximately two servings of fish per week noting numerous studies linking the consumption of EPA and DHA with a wide variety of potential cardiovascular health benefits (1). There is some confusion around these recommendations in portions and types of fish. For portions, two servings are identified to be a total of roughly 8 ounces, while later a single portion is defined as 3 ounces of fish. A few types of fish higher in EPA and DHA due to their oil content are mentioned, but when servings are discussed there are no suggestions for types to consume (1).

In their position statement on dietary fatty acids, the American Dietetic Association concurs with the DGA recommendation (2). Consumption of 8 ounces per week of fatty fish will provide nearly the equivalent of a daily intake of 500 mg of EPA and DHA combined (2). The American Heart Association also recommends consuming various types of fatty fish at least two times a week (3). Unfortunately,



according to recent national surveys most Americans are not meeting this recommendation (4, 5).

## **1.2 Literature review**

### **1.2.1 Benefits of seafood consumption**

Numerous studies have documented benefits of consuming seafood, primarily with regard to cardiovascular and cognitive health. High fish consumption was found to be positively associated with lower incidence of congestive heart failure (CHF) in a group of older adults (6). Participants with intakes of one to two times per week, close to dietary recommendations, had a 20% lower risk of CHF. Even better results were found with those having at least three servings per week, decreasing their risk up to 30% (6). Another population-based study in the Attica region of Greece looked at the amount of fish consumed, as well as overall omega-3 intake, in a healthy adult population (7). Intakes of both were found to have an inverse relationship to pro-inflammatory markers such as C-reactive protein (CRP), interleukin (IL)-6 and tumor necrosis factor (TNF) (7).

Benefits have also been found in brain health and function. A meta-analysis of six studies looked at the relative risk of stroke, ischemic and hemorrhagic combined, and fish intake, although results are equivocal (8). Some animal studies have linked an increase in hemorrhagic stroke incidence with increased fish consumption (9). However Bouzan et al., (8) found a reduction of overall stroke risk, even with small amounts of fish consumed, compared to no fish intake. The authors suggest their results may be due to the relatively low percentage of hemorrhagic strokes compared to ischemic, which they state will only minimize the reduction in

risk. In their opinion, any increased risk for hemorrhagic stroke would be due to consumption of PUFAs beyond what is typically consumed by the US population. In another study, cognitive decline in a group of older men over a 5-year period was reduced with higher fish intake as well as the overall omega-3 consumed in the diet (10).

### **1.2.2 Risks of seafood consumption**

The primary risk of seafood consumption is food safety with regard to pathogens. Another smaller but more frequently discussed risk comes from the traces of mercury found in all seafood products (11). The primary source comes from the burning of coal and other industrial pollution, which releases mercury into the air (12). It eventually falls to the ground and ends up in water sources where bacteria convert it to a more potent toxin, methylmercury (12). Methylmercury builds up in the flesh of fish in various amounts, with those fish that are longer-lived and higher on the food chain accumulating the most (12).

As a potent neurotoxin, unborn and young children are at greatest risk for damage from methylmercury exposure (12). Therefore, in 2004, the United States Food and Drug Administration (FDA) and Environmental Protection Agency (EPA) issued a joint advisory titled “What you need to know about mercury in fish and shellfish” (11). The goal of the advisory is to educate consumers to avoid consumption of four species of fish highest in methylmercury (shark, swordfish, king mackerel, and tilefish) by specific populations most vulnerable to its effects, namely the young and women who are or may become pregnant (11).

### **1.2.3 Studies of seafood consumers**

Seafood consumers have been the subjects of various studies. A study in Belgium used the Theory of Planned Behavior (Appendix A) as the basis to examine consumer behavior with regard to seafood (13). A second objective was to look at whether personal characteristics or the three individual determinants of 1) attitude, 2) social pressure and 3) perceived behavioral control had any effect on a person's intention to eat fish. The theory assumes intention is the most important determinant and is influenced by the above factors. Results indicated all three of these determinants positively influenced the intention to eat fish. Furthermore, intention to eat fish and the behavioral control determinant positively affected consumption. Being female, older than 40 years of age and living in a coastal region were each identified as the most influential personal characteristics on the consumption of fish. The biggest limitation of this study was surveying only seafood consumers who are the primary food purchasers for the household (13).

Similar to that study, the majority of other recent investigations of seafood consumers have been done in foreign countries (14-19). A summary of those study results can be found in Table 1.1 below.

**Table 1.1 Studies of seafood consumers in foreign countries**

<b>AUTHOR</b>	<b>DATE/ COUNTRY</b>	<b>CONSUMER</b>	<b>FISH CONSUMPTION (+/-/0 CORRELATION) (* OTHER FINDINGS)</b>
Verbeke et al (13)	2005  Belgium	N = 429 - Eat fish - Primary purchaser - 18 - 83 Y - User = $\geq$ 1/week	(+) Positive attitude towards fish, higher moral and peer pressure, more confidence in buying and preparing, female, > 40 years of age, coastal residence, food involvement, habit (-) Young children in household (0) Household size
Verbeke et al (14)	2004  Belgium	N = 429 (Same cohort as 2005) - 18 - 83 Y - Heavy user = $\geq$ 1/week	* Women believe consumption = better health idea; reduce CHD risk * Men assume more harmful substances in fish * Consumer awareness of risk is > awareness of health benefits
Rortveit et al (15)	2007  Denmark	N = 1100 -20 - 65 Y - Primary shopper & cook in household	(+) Larger consideration set size, positive attitude towards fish, knowledge of product category * Attitude is a very effective predictor of behavior * Attitude has > influence than knowledge
Olsen et al (16)	2003  Norway	N = 1450 - 20 - 70 Y - Person responsible for dinner preparation	(+) Attitude, health involvement * Attitude is the most important predictor * Healthy eating a mediator between age & consumption * Elderly more involved in healthy eating (+) Between [age & attitude], [health involvement & attitudes], [age & perceived convenience]

**Table 1.1 Continued**

<b>AUTHOR</b>	<b>DATE/ COUNTRY</b>	<b>CONSUMER</b>	<b>FISH CONSUMPTION (+/-/0 CORRELATION) (* OTHER FINDINGS)</b>
Trondsen et al (17)	2004  Norway	N = 9407 - 45 - 69 Y - Women - User = $\geq$ 1/week	(+) Region of residence, age with lean & fat fish, household size $\geq 2$ for lean fish, other healthy food variables, use of medicine for CVD, current smoker, belief about food and health, perceived health status (0) Age with processed, education, income with fat fish, children in household (-) Household size $\geq 4$ for fat fish, income for lean and processed * Type of fish may be influenced by convenience factor, skill in preparation
Olsen et al (18)	2007  Denmark, Poland, Belgium, Spain, Netherlands	N = 1110 in Denmark 1015 in Poland 852 in Belgium 1000 in Spain 809 in Netherlands - 39 - 46 Y - Primary shopper & cook - ONLY fish, not shellfish or other seafood, & eaten at home	(-) Perceived inconvenience of fish (+) Between [convenience orientation & perceived inconvenience of fish] * At home consumption: 81% average * Same structural characteristics and meaning of convenience orientation (consumer attitude of time savings and ease of use) across food cultures * Consumers perceiving fish as inconvenient have lower attitude toward fish * A structural relationship exists between convenience, attitude and consumption frequency
Sontrop et al (19)	2007  Ontario	N = 2394 - Pregnant (10 - 22 wk gest.) -Consumption = < 1/week OR $\geq$ 1/week	(+) Education, age, activity level (-) Smoking, obese, meeting Canadian dietary guidelines, lower SES, variables of less healthy lifestyle * 32% ate <1 time/week

Many of those studies found a positive attitude towards seafood (13, 15, 16, 18), convenience (16-18), knowledge of seafood (13, 15, 17) and healthy habits (14, 16, 17, 19) were important in the consumption of seafood. Similar to the previously mentioned study, most of these have limited respondents to those who were primary shoppers or cooks in the household (14-16, 18). One study limited the age and used only female participants (17), while another limited the cohort to pregnant women (19). None of the studies identified the size of a portion and all consumption was based on frequency of eating seafood.

Only two recent studies were found looking at the US population with regard to seafood consumers (Table 1.2) (4, 5).

**Table 1.2 Studies of seafood consumers in the United States**

<b>AUTHOR</b>	<b>DATE/ COUNTRY</b>	<b>CONSUMER</b>	<b>FISH CONSUMPTION (+/-/0 CORRELATION) (* OTHER FINDINGS)</b>
Storey et al (5)	2006  United States - continental	N = 1040 - $\geq 18$ Y - Private households	(+) Age, education (0) Gender, income, race/ethnicity * 36% eat > 1 time/week, 17% $\geq$ 2/week * 31% concerned about mercury in fish * 66% recall hearing about health effect of eating fish (either positive or negative) * Confusion about FDA/EPA advisory among participants
McDermott (4)	2007  United States	N = 1062 - $\geq 18$ Y - $\frac{1}{2}$ Men - $\frac{1}{2}$ Women	* 88% eat some seafood but only 19% eat $\geq 2$ times/week * Uncertainty by participants when the advisory weighed against health benefits * 75% are aware of advisory, but only 16% are knowledgeable of its contents

The 2006 study looked at adult consumer awareness of seafood issues and changes in consumption following the release of the EPA/FDA advisory (5). Three questions were posed to address the potentially conflicting information between the health benefits and methylmercury risks of eating seafood. First they sought to determine what consumers' reactions were to the conflicting messages. Second they hoped to ascertain how successfully those in the women of childbearing age (WCBA) audience were receiving messages. And third, they attempted to find out if the non-WCBA consumers were correctly interpreting the advisory. This telephone interview of a nationally representative sample was completed with 1,040 adults over the age of 18 in June 2005. A majority of the respondents (66%) had not changed the amount of seafood they consumed in the previous year. However, results showed many respondents demonstrated confusion over who constituted the 'target' audience of the FDA/EPA advisory and which species of fish were high in mercury. Additional data showed 89% of the population ate seafood but only 17% met the recommendation of 2 servings/week. Those in the >65 age group had the highest percent of consumption (52%) of at least 1 serving/week. (5). Table 1.3 shows the percent of participants in various consumption groups found in this study compared to other studies by McDermott (2007) and Sontrop et. al. (2007).

**Table 1.3 A comparison of consumption group definitions and study findings for consumption**

REFERENCE	CONSUMPTION GROUPS							
Storey et al (5) <sup>a</sup>	Overall	Daily	Couple X <sup>b</sup> / week	1 X/ week	Couple X/ month	1 X/ month	< 1 X/ month	Never
	89%	0%	17%	18%	24%	12%	17%	11%
McDermott (4), Hicks et al (20) <sup>a</sup>		N/A	≥ 2X/ week	At least 1 X/ week	Few X/ month		Once every 2-3 months or < <sup>c</sup>	
	88%		19%	21%	26%	11%	11%	12%
Sontrop et al (19) - Pregnant women only			≥ 1X/ week <sup>d</sup>	< 1X/ week				
			68%	32%				

<sup>a</sup> - Consumption group identification names differ

<sup>b</sup> - X = times (frequency)

<sup>c</sup> - Two groups combined due to small size and little difference in frequency

<sup>d</sup> - Inferred, only <1X/week % given

The 2007 McDermott survey was completed with another sample of 1062 adults residing in the United States (4). The purpose of this study was to gain a more accurate description of seafood consumers in the US with regards to behavior and understanding of seafood and the advisory. The primary focus of this report was the WCBA target audience of the advisory (n = 318). Consumption was similar to the previously mentioned study with 88% overall consuming some seafood, but only 19% having intakes of ≥ 2 times per week (Table 1.3). Overall results indicated uncertainty on the part of respondents when the advisory was weighed against the health benefits of seafood (4).



In this Internet based survey by McDermott (4) an extensive set of questions was asked on consumer knowledge, attitudes and perceptions to identify potential barriers to meeting recommendations, but many were not analyzed. Primary authors felt responses to these questions needed further evaluation to add to the understanding of consumer seafood consumption behavior (4).

## **Chapter 2**

### **PURPOSE OF STUDY**

#### **2.1 Purpose of this study**

The purpose of this study was to further our understanding of consumer perceptions and reasons for current decisions regarding seafood consumption. This was accomplished by completing a secondary data analysis of variables not studied in the primary investigation by McDermott (4). It is important to identify differences in characteristics of those who eat the recommended amount of seafood and those who do not, in order to promote seafood consumption to the population as a whole, to meet national recommendations. The potentially conflicting information perceived by consumers regarding seafood safety needs clarification to the public at large and the media. Results of this study are intended to provide educators and health practitioners with a basis for developing more effective messages promoting the benefits of seafood consumption.

#### **2.2 Operational definitions**

**Seafood:** all marine and freshwater finfish (e.g. tuna, shark, and flounder) crustaceans (e.g. shrimp, crabs), mollusks (e.g. clams, oysters, mussels) and other forms of aquatic life (including squid, sea turtle, jellyfish, sea cucumber, and sea urchin and the roe of such animals) other than birds or mammals, harvested for human consumption. Seafood can be wild or farm-raised, processed (e.g. canned, frozen, smoked, pickled, breaded) self-caught, or fresh from a market or restaurant (4).

**CSE-R:** Current seafood eaters meeting or exceeding DGA recommendations of 2 seafood servings per week as determined by responses to the survey questions (Figure 2.1)

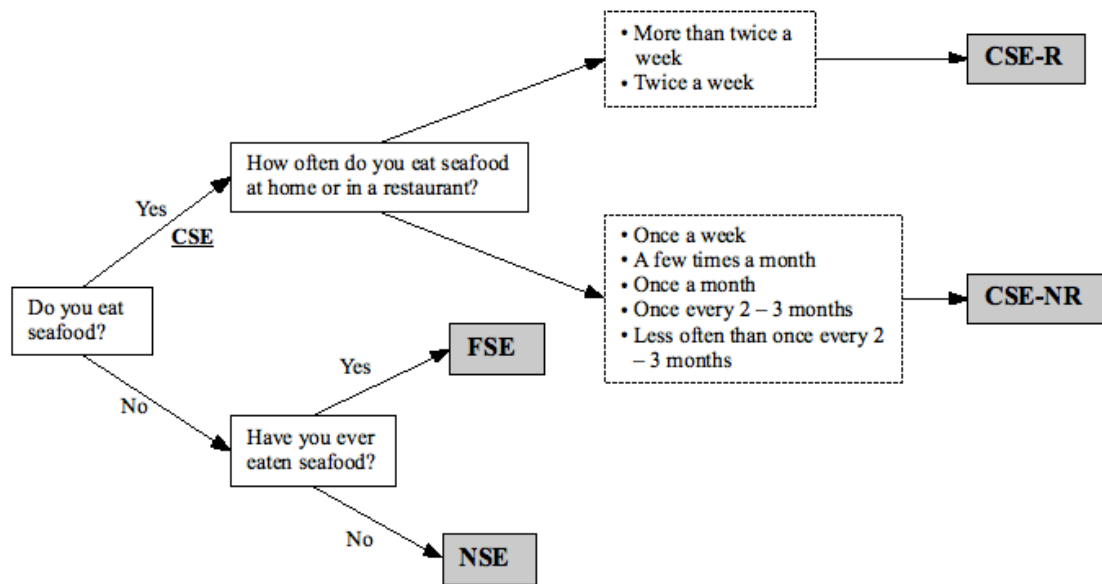
**CSE-NR:** Current seafood eaters not meeting recommendations

**FSE:** Former seafood eater

**NSE:** Non-seafood eaters

**Region of Residence:**

1. One of the four US census regions: Northeast, Midwest, South, West (21)
2. Coastal versus Inland states (Table 2.1)



**Figure 2.1** Conceptual model for defining consumer groupings

### **2.3 Research questions**

Dependent Variable: Quantity of seafood consumption (CSE-R, CSE-NR, FSE, NSE)

1. How do age, gender, education, household income, ethnicity, and location of residence (Table 2.1) affect the quantity of seafood consumption?
2. How do consumer self-reported knowledge and decision factors impact the quantity of seafood consumption (Table 2.2)?
3. How do correct responses to knowledge statements impact the quantity of seafood consumption (Table 2.3)?
4. How do attitude statement responses in the four individual statement categories (Trust, Environmental, Purchasing, and Health) influence the quantity of seafood consumption (Table 2.4)?
5. How does consumption location (home prepared or restaurant/fast food) affect seafood consumption within the CSE-R and CSE-NR groups?
6. How do either current or preferred sources of seafood information influence the quantity of seafood consumption?
7. How do either status as primary shopper or decision maker of dining location influence the quantity of seafood consumption?

**Table 2.1 Identification of coastal and inland states for demographic analysis**

<b>Coastal states</b>		
Alabama	Hawaii	New York
Alaska	Louisiana	North Carolina
California	Maine	Oregon
Connecticut	Maryland	Rhode Island
Delaware	Massachusetts	South Carolina
District of Columbia	Mississippi	Virginia
Florida	New Hampshire	Washington
Georgia	New Jersey	
<b>Inland States</b>		
Arizona	Minnesota <sup>a</sup>	Pennsylvania <sup>a</sup>
Arkansas	Missouri	South Dakota
Colorado	Montana	Tennessee
Idaho	Nebraska	Texas
Indiana	Nevada	Utah
Illinois <sup>a</sup>	New Mexico	Vermont
Iowa	North Dakota	West Virginia
Kansas	Ohio <sup>a</sup>	Wyoming
Kentucky	Oklahoma	Wisconsin <sup>a</sup>
Michigan <sup>a</sup>		

<sup>a</sup> Great Lake States

**Table 2.2 Self-reported knowledge and decision factors: Self-reported ranking of knowledge on seafood topics and the importance of each as a purchasing decision factor**

<b>Seafood Topic</b>	<b>Self-reported knowledge <sup>a</sup></b>	<b>Purchasing decision factors <sup>b</sup></b>
Seafood contaminants		
Safe Seafood handling practices		
Health benefits of eating seafood		
Fish consumption advisories		
Where seafood comes from		
Organic or Eco-labeled seafood products		
Seafood quality		
Seafood preparation		
Seafood selection at a market		
Farm-raised seafood		
Seafood storage		
Wild-caught seafood		

<sup>a</sup> Response choices for self-reported knowledge: Not knowledgeable, Somewhat knowledgeable, Knowledgeable, Very knowledgeable

<sup>b</sup> Response choices for purchasing decision factors: Not important, Somewhat important, Important, Very important

**Table 2.3 Knowledge statements: Statements used to determine knowledge of consumers**

<b>Knowledge statements</b>	<b>RESPONSES</b>		
	Disagree	Not sure <sup>a</sup>	Agree
Deep-fat frying is a healthy way to prepare seafood	X		
The price of farm-raised fish is lower than a wild-caught fish of the same species			X
Oily fish, like tuna and salmon, are a good source of omega-3 fatty acids			X
Seafood is an excellent source of high-quality protein			X
Aquaculture and farm-raised seafood are the same			X
Proper trimming of recreationally caught fish can reduce the level of potential contaminants			X
Allergens and disease-causing bacteria are the biggest food safety issues associated with seafood			X
Nutrition professionals recommend eating seafood twice a week			X
Americans eat more seafood than beef or poultry	X		
Every state posts fish consumption advisories about locally caught fish			X

X: Indicated the correct response

<sup>a</sup> “Not Sure” responses are considered incorrect

**Table 2.4    Attitude statements**

<b>Attitude Statements</b>	<b>* Strongly disagree</b> <b>* Disagree</b>	<b>* Neither agree or disagree</b>	<b>* Agree</b> <b>* Strongly agree</b>
<b>Trust statements</b>			
I trust the media to present the facts about seafood			
I think consumer groups provide accurate information about seafood			
People should follow government advice about which seafood to eat			
I trust store personnel to be knowledgeable about the seafood I buy			
Seafood imported to the USA is as safe as locally harvested products			
The government ensures that the seafood I buy is safe			
<b>Environmental statement</b>			
I believe overfishing is a problem			
<b>Purchasing statements</b>			
Seafood is too expensive			
I feel comfortable buying and preparing seafood at home			
It is easy to judge the freshness of seafood			
<b>Health statements</b>			
I think seafood is good for your health			
I think that pregnant women should eat seafood			
There is no need to be concerned about which seafood to eat			



## **Chapter 3**

### **METHODS**

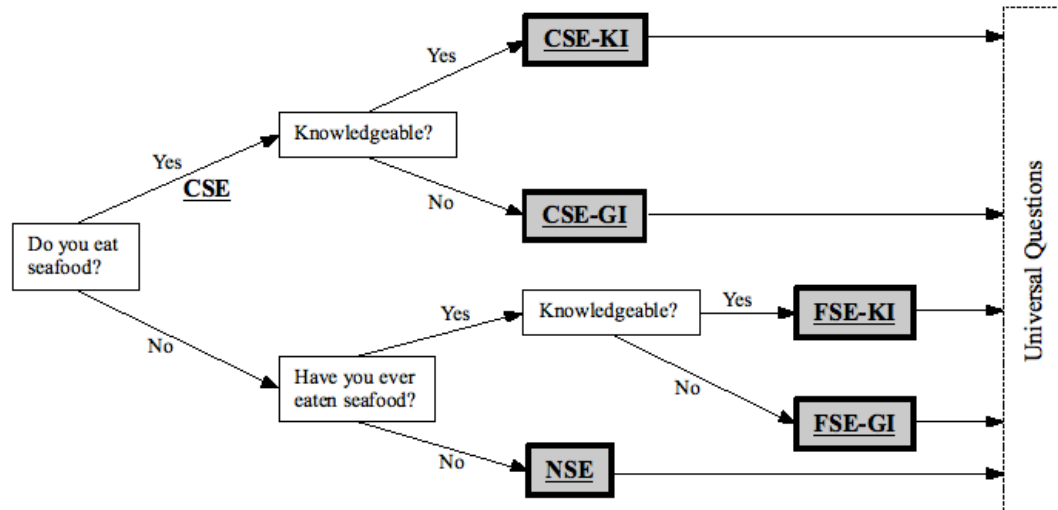
#### **3.1 Original survey**

A nationwide Internet survey (Appendix B) was developed through the University of Delaware College of Earth, Ocean and Environment to clarify the knowledge, attitudes and perceptions of consumers with regard to seafood (4). Assessment was also done to determine what positive and negative messages are reaching the consumer, as well as their benefit versus risk views (20). Pivarnik et al. (22) provided the model for this survey. The Fisheries Scholarship Foundation of the National Fisheries Institute provided funding for the survey. The University of Delaware Sea Grant Program, the University of Rhode Island Cooperative Extension Program and the Rhode Island Sea Grant provided support (20).

The survey was conducted through Zoomerang, an online survey clearinghouse created by MarketTools ® (20). Surveys through Zoomerang allow individuals or businesses to specify demographics and other aspects to be used in defining the desired respondents. There are over 2.5 million US households with potential panelists who are offered entry into a sweepstakes or lottery as an incentive to complete a survey. Target response numbers dictate the number of surveys sent out and the length of time the survey is available for completion. For example, if the required response rate is 10% and 2000 responses are desired, 20,000 potential respondents will be selected. The survey was launched on July 27, 2006 and ended on

August 7, 2006 once the programmed goal of 1000 responses was met with a total count of 1062 completed surveys. The predetermined respondent characteristics were a minimum age of 18 years and demographically comparable to US census data for the same time period. There was no limitation placed on a specific food consumption pattern (20).

In the survey, respondents were given a seafood definition specified by the FDA in the Seafood Hazard Analysis Critical Control Point (HACCP) regulation (Title 21 part 123, Section 123.3) (20). Questions in the survey were grouped into five categories: 1) demographics, 2) consumption frequency, 3) self-assessment of risks and benefits, 4) knowledge and 5) attitude (20). Not all categories were used in their entirety for my study. The Zoomerang software allows for the use of Skip Logic, a feature providing alternative pathways of questions based on a respondent's previous answer (4). Figure 3.1 outlines the design of the survey and the identification of groups used by McDermott (4).



**Figure 3.1** Skip logic pathways used by McDermott, 2007. KI = Know Information - respondent had previous knowledge of EPA/FDA seafood advisory. GI = Given Information - respondent provided with the advisory information prior to completing the remainder of the survey.

### **3.2 Secondary analysis**

For this study, a secondary data analysis was completed comparing current seafood eaters who consume the DGA recommended amounts (CSE-R), those not meeting recommendations (CSE-NR), former seafood eaters (FSE) and non-seafood eaters (NSE) as the dependent variable. Comparisons were made using demographics and region of residence. Answers to questions pertaining to the respondent's knowledge of seafood were used to help to identify areas to focus on for future consumer training and education. Attitude statement responses, both positive and negative were also evaluated. This will potentially detect differences between consumers, which may be useful for future promotional messages. Further clarification was obtained by looking at factors contributing to consumer purchasing decisions and the self-ranking of the importance of these factors. Current and preferred sources of obtaining information were also identified. Results will aid in determining the best route to promote the consumption of seafood.

### **3.3 Human subjects**

This study is a secondary analysis with no personal identifiers on the data. Therefore, human subjects review was not required.

### **3.4 Statistical analysis**

Preliminary statistical analyses were completed using Predictive Analytics Software (PASW version 17.0, 2009, SPSS Inc., Chicago IL) including descriptive statistics, one-way frequencies and cross tabulations. Pearson chi square significance was set at  $< 0.05$ . The FSE and NSE categories of the dependent variable contained too few observations for use in the cross tabulation analyses. Because neither

category consumes seafood they were collapsed into the new group defined as 'NONE'. Independent variables of age, education, income and ethnicity were also collapsed into three groups per variable. This was done due to small numbers found in many individual groups.

The Monte Carlo method was used to estimate significance using Statistical Analysis Software (version 9.2, 2008, SAS Institute Inc., Cary NC) in the cross tabulations. Initially it was applied in cases in which cells had an expected count less than five (which does not meet Pearson chi square assumptions) and eventually implemented to validate all cross tabulations.

Remaining statistics were completed using the aforementioned PASW software. Factor analyses were completed for responses to questions on self-reported knowledge, purchasing decision items, attitude statements, knowledge statements and methods of obtaining information. This reduced the large number of variables for these areas of the survey into 'factors'. Each factor is an index defined by the mean of variables with high factor loadings on a single factor. Further description of these factor analyses is found in the following '3.5 Measurements' section of this chapter.

A linear regression was completed using these factors, demographics and other independent variables. The un-collapsed description of seafood consumption (NSE, FSE, CSE-NR and CSE-R) was used as the dependent variable for the regression. Categorical independent variables were entered as factors to determine differences between a reference category and the remaining groups of the variable. With the region variable, the West was used as the reference. For the final two questions of "Are you the primary food shopper for your household?" and "Do you

make the decision about where to dine out in your household?” the ‘shared’ response was identified as the reference category.

Education was initially run as a factor as well. However, results showed a monotonic decline in the coefficients with each increase in the level of schooling. Therefore, in the regression models, education was used as an approximate continuous covariate variable. The remaining demographics of gender, water state residence, income (log of income) and age were entered as covariates. Dummy variables were created for ‘prefer not to answer’ responses of education and income variables. The five factor analyses indices described below in the ‘3.5 Measurements’ section were the remaining covariates of the regressions.

### **3.5 Measurements**

The research questions regarding determinants of seafood consumption propose that latent factors influence the quantity of seafood that respondents consume. The five factors are: (1) attitude about seafood, (2) actual knowledge of seafood, (3) self-reported knowledge about seafood, (4) decision factors in purchasing seafood, and (5) sources of information about seafood. A set of questionnaire items is intended to measure each of these factors. Five factor analyses were conducted corresponding to each of these five factors. The next sections describe the factor analyses and report the reliability of each of the five measurements.

#### **3.5.1 Attitude statements**

The thirteen items listed in Table 3.1 were included in the factor analysis as potential measures of attitudes regarding seafood. A principal-components

extraction reported three eigenvalues greater than 1.0. And the associated scree plot appears to level off after three factors (Figure 3.2).

Table 3.1 also lists eigenvalues and associated unrotated factor loadings for each item. Eight of these items are associated with high loadings on Factor 1, but item 1 also is associated with a high loading on factor 3. The second and third factors each contain just one item with a high loading. Results suggest one factor containing just seven of the thirteen items.

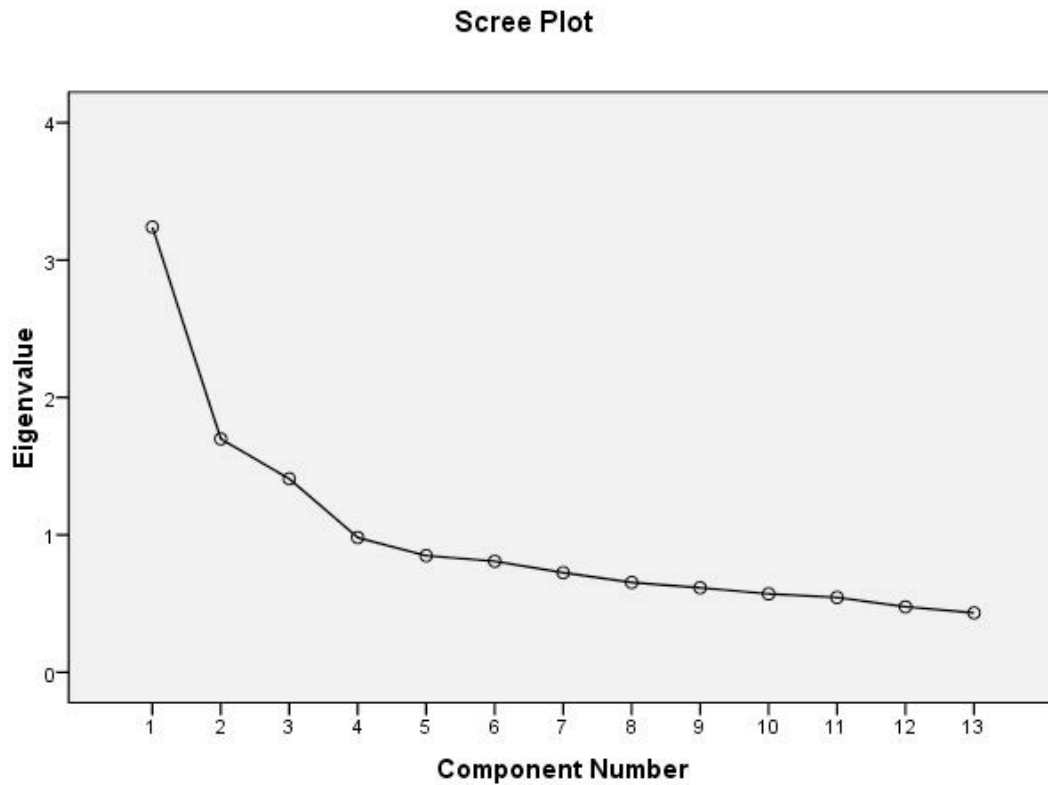
The primary investigators (20) of this study grouped the attitude statements into four categories: (1) trust statements, (2) environmental statements, (3) purchasing statements, and (4) health statements. Items 4, 8, 9, 10, 11 and 13 are trust items, as identified by Hicks et al (20). All six of these are associated with high factor loadings on Factor 1. But item 1 also has a high loading on Factor 3 and was excluded from the measure of trust. Item 5 was also rejected from the index because it does not pass the content validity test. In summary, the index of the ‘attitude of trust’ contains items 4, 8, 9, 10, 11, and 13 ( $\alpha = 0.72$ ).

**Table 3.1 Component matrix of the ‘attitude statements’ factor analysis**

<b>Item</b>	<b>Factor 1<sup>a</sup></b>	<b>Factor 2</b>	<b>Factor 3</b>
1. I feel comfortable buying and preparing seafood at home.	<b>0.556</b>	0.083	<b>0.554</b>
2. Seafood is too expensive.	0.219	-0.284	-0.098
3. I believe overfishing is a problem.	0.292	-0.382	0.425
4. The government ensures that the seafood I buy is safe.	<b>0.627</b>	0.078	-0.401
5. I think seafood is good for your health.	<b>0.582</b>	-0.247	0.452
6. I think that pregnant women should eat seafood.	0.407	0.439	0.281
7. It is easy to judge the freshness of seafood.	0.433	0.427	0.333
8. Seafood imported to the USA is as safe as locally harvested products.	<b>0.532</b>	0.368	-0.148
9. I trust the media to present the facts about seafood.	<b>0.575</b>	-0.186	-0.433
10. I think consumer groups provide accurate information about seafood.	<b>0.599</b>	-0.345	-0.075
11. People should follow government advice about which seafood to eat.	<b>0.558</b>	-0.496	-0.165
12. There is no need to be concerned about which seafood to eat.	0.287	<b>0.692</b>	-0.207
13. I trust store personnel to be knowledgeable about the seafood I buy.	<b>0.588</b>	0.093	-0.267
<b>Eigenvalue</b>	3.240	1.698	1.408
<b>% Of Variance (per factor)</b>	24.925	13.065	10.833

<sup>a</sup> **Bold** indicates factor loadings exceeding 0.5 which are defined as “high” factor loadings





**Figure 3.2** Scree plot for the factor analysis of the variable ‘attitude statement’ items

### 3.5.2 Knowledge statements

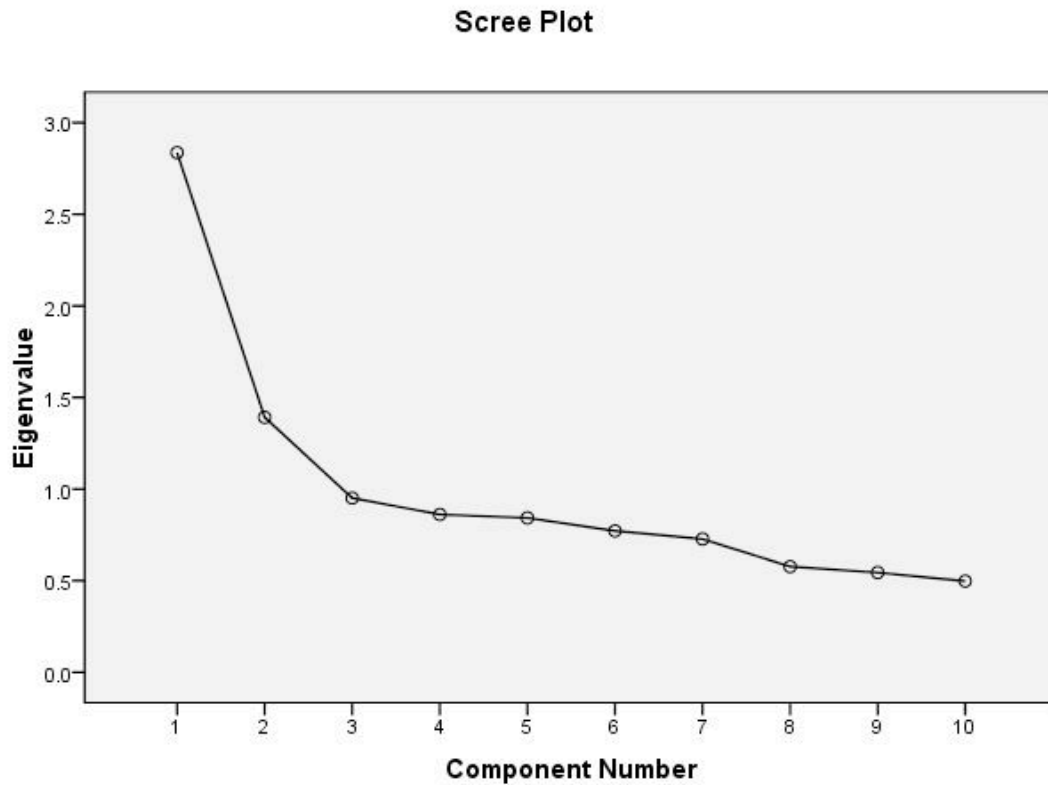
The ten items listed in Table 3.2 were included in the factor analysis as potential measures of knowledge about seafood. A principal-components extraction reported two eigenvalues greater than 1.0. The associated scree plot appears to level off after two factors (Figure 3.3).

Table 3.2 also lists eigenvalues and associated unrotated factor loadings for each item. Five of these items are associated with high loadings on Factor 1. The second factor contains just one item with a high loading. Results suggest one factor containing just five of the 10 items. This index of ‘knowledge of health’ had an  $\alpha = 0.741$

**Table 3.2 Component matrix of the ‘knowledge statements’ factor analysis**

<b>Item</b>	<b>Factor 1<sup>a</sup></b>	<b>Factor 2</b>
1. Deep-fat frying is a healthy way to prepare seafood.	<b>0.624</b>	-0.450
2. The price of a farm-raised fish is lower than a wild-caught fish of the same species.	0.388	0.188
3. Oily fish, like tuna and salmon, are a good source of omega-3 fatty acids.	<b>0.710</b>	-0.160
4. Seafood is an excellent source of high-quality protein.	<b>0.749</b>	-0.122
5. Aquaculture and farm-raised seafood are the same.	0.255	<b>0.516</b>
6. Proper trimming of recreationally caught fish can reduce the level of potential contaminants.	0.382	0.486
7. Allergens and disease-causing bacteria are the biggest food safety issues associated with seafood.	0.398	0.441
8. Nutrition professionals recommend eating seafood twice a week.	<b>0.681</b>	-0.076
9. Americans eat more seafood than beef or poultry.	<b>0.512</b>	-0.410
10. Every state posts fish consumption advisories about locally caught fish.	0.369	0.492
<b>Eigenvalue</b>	2.836	1.392
<b>% Of Variance (per factor)</b>	28.365	13.917

<sup>a</sup> **Bold** indicates factor loadings exceeding 0.5 which are defined as “high” factor loadings



**Figure 3.3** Scree plot for the factor analysis of the variable ‘knowledge statement’ items

### 3.5.3 Self-reported knowledge

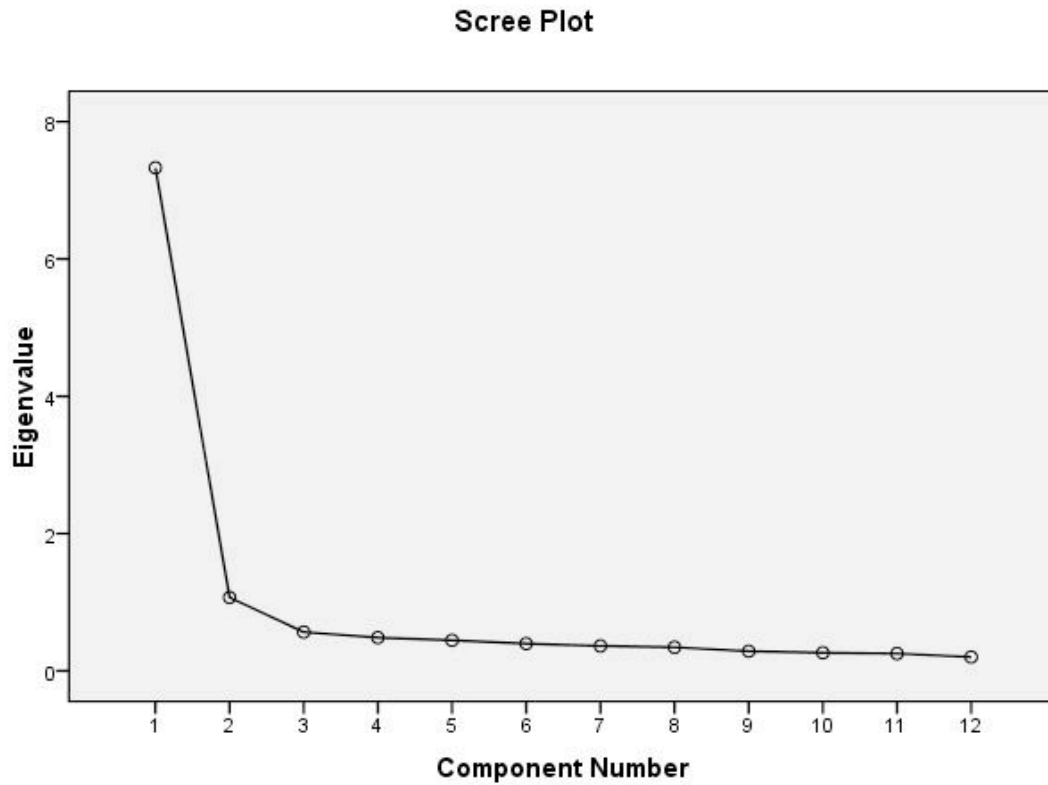
The twelve items listed in Table 3.3 were included in the factor analysis as potential measures of self-reported knowledge about seafood. A principal-components extraction reported two eigenvalues greater than 1.0. The associated scree plot appears to level off after two factors (Figure 3.4).

Table 3.3 also lists eigenvalues and associated unrotated factor loadings for each item. All 12 items are associated with high loadings on Factor 1. The second factor contains only item 6 with a higher loading on Factor 2 than Factor 1. Because it loads heavily on both factors, it was excluded from the final index. The results suggest one factor containing 11 of the 12 items. This index of ‘self-reported knowledge’ had an  $\alpha = 0.943$ .

**Table 3.3 Component matrix of the ‘self-reported knowledge’ items factor analysis**

<b>Item</b>	<b>Factor 1<sup>a</sup></b>	<b>Factor 2</b>
1. Seafood contaminants.	<b>0.754</b>	0.319
2. Safe seafood handling practices.	<b>0.844</b>	-0.209
3. Health benefits of eating seafood.	<b>0.779</b>	-0.164
4. Fish consumption advisories.	<b>0.731</b>	0.347
5. Where seafood comes from.	<b>0.754</b>	-0.178
6. Organic or eco-labeled seafood products.	<b>0.577</b>	<b>0.634</b>
7. Seafood quality.	<b>0.864</b>	-0.138
8. Seafood preparation.	<b>0.807</b>	-0.326
9. Seafood selection at the market.	<b>0.818</b>	-0.210
10. Farm-raised seafood.	<b>0.777</b>	0.313
11. Seafood storage.	<b>0.824</b>	-0.251
12. Wild-caught seafood.	<b>0.809</b>	0.118
<b>Eigenvalue</b>	7.328	1.070
<b>% Of Variance (per factor)</b>	61.064	8.915

<sup>a</sup> **Bold** indicates factor loadings exceeding 0.5 which are defined as “high” factor loadings



**Figure 3.4** Scree plot for the factor analysis of the variable ‘self-reported knowledge’ items

#### **3.5.4 Purchasing decision items**

The twelve items listed in Table 3.4 were included in the factor analysis as potential measures of decision aspects for purchasing seafood. A principal-components extraction reported two eigenvalues greater than 1.0. And the associated scree plot appears to level off after two factors (Figure 3.5).

Table 3.4 also lists eigenvalues and associated unrotated factor loadings.

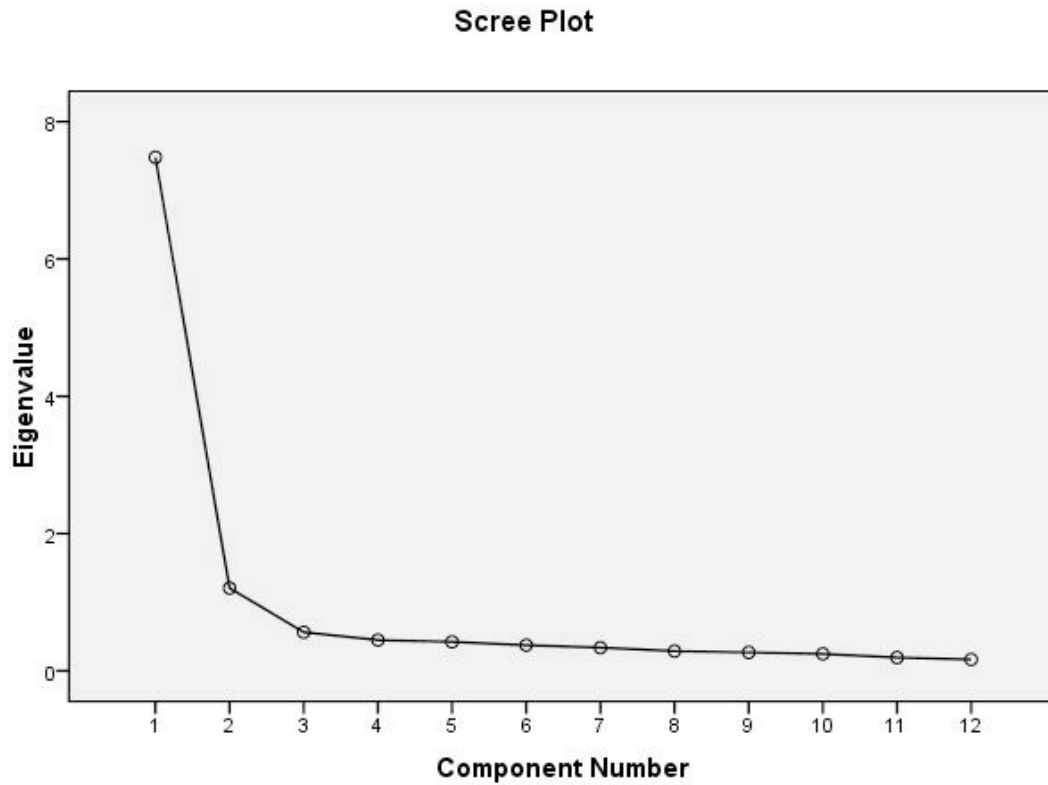
All 12 items are associated with high loadings on Factor 1. The second factor contains only item 6 with a high loading. Because item 6 loads on both factors it was excluded from the final index. The results suggest one factor containing 11 of the 12 items.

This index of ‘purchasing decision’ items had an  $\alpha = 0.945$

**Table 3.4 Component matrix of the ‘purchasing decision’ items factor analysis**

<b>Item</b>	<b>Factor 1<sup>a</sup></b>	<b>Factor 2</b>
1. Seafood contaminants.	<b>0.825</b>	-0.099
2. Safe seafood handling practices.	<b>0.854</b>	-0.313
3. Health benefits of eating seafood.	<b>0.802</b>	-0.082
4. Fish consumption advisories.	<b>0.773</b>	0.159
5. Where seafood comes from.	<b>0.824</b>	0.209
6. Organic or eco-labeled seafood products.	<b>0.627</b>	<b>0.538</b>
7. Seafood quality.	<b>0.825</b>	-0.374
8. Seafood preparation.	<b>0.840</b>	-0.289
9. Seafood selection at the market.	<b>0.791</b>	-0.121
10. Farm-raised seafood.	<b>0.706</b>	0.496
11. Seafood storage.	<b>0.842</b>	-0.272
12. Wild-caught seafood.	<b>0.733</b>	0.419
<b>Eigenvalue</b>	7.480	1.206
<b>% Of Variance (per factor)</b>	62.332	10.054

<sup>a</sup> **Bold** indicates factor loadings exceeding 0.5 which are defined as “high” factor loadings



**Figure 3.5** Scree plot for the factor analysis of the variable ‘purchasing decision’ items

### 3.5.5 Sources of seafood information

Eighteen items listed in Table 3.5 were included in the factor analysis as potential measures of sources of information about seafood. A principal-components extraction reported five eigenvalues greater than 1.0. Although the associated scree plot appears to level off after two factors (Figure 3.6).

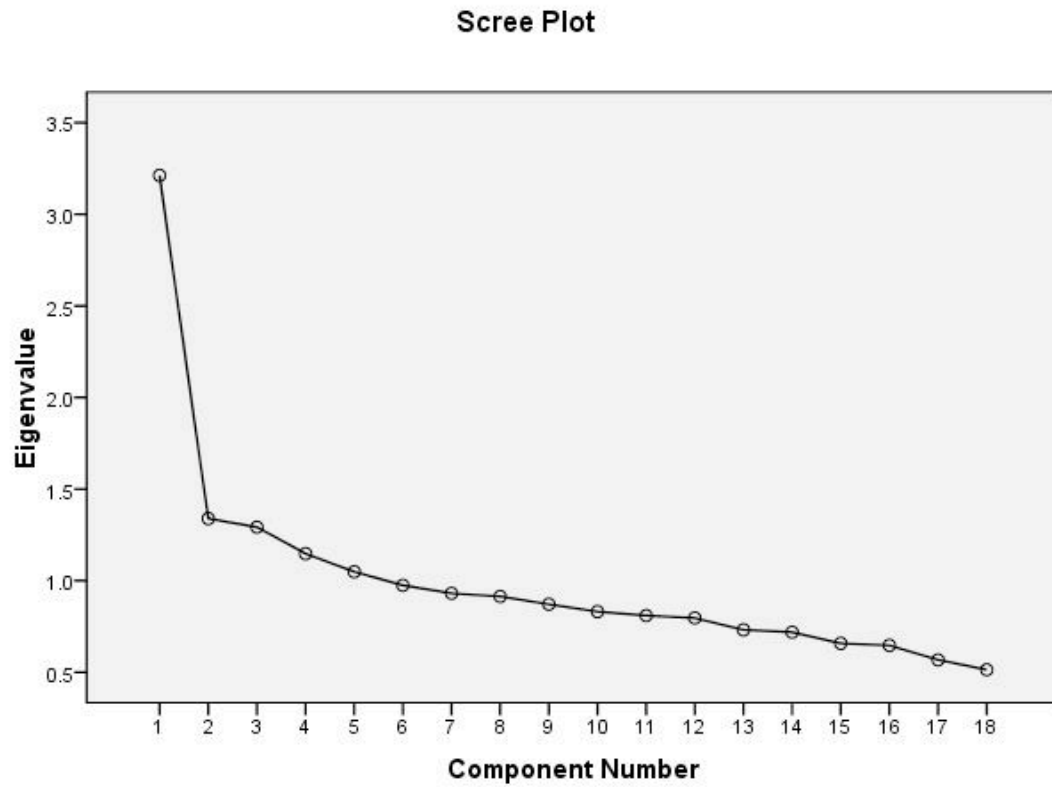
Table 3.5 also lists eigenvalues and associated unrotated factor loadings for each item. Nine of the 18 items are associated with high loadings on Factor 1. The second factor contains just one item with a high loading. The results suggest one factor containing nine of the 18 items. This index of ‘experts and publications’ had an  $\alpha = 0.69$

**Table 3.5 Component matrix of the ‘sources of seafood information’ items factor analysis**

<b>Item</b>	<b>Factor 1<sup>a</sup></b>	<b>Factor 2</b>
1. Physician.	<b>0.408</b>	-0.279
2. Nutritionists/Dietitians.	<b>0.480</b>	-0.361
3. Media (TV, radio, magazines, newspapers, etc).	0.131	-0.167
4. Point of purchase information.	<b>0.418</b>	0.271
5. Workshops or seminars.	0.386	0.298
6. Internet.	0.283	-0.372
7. In-store signs or demonstrations.	0.385	0.326
8. Family/Friends.	0.233	0.113
9. Government publications.	<b>0.572</b>	-0.077
10. University/Extension.	0.344	0.239
11. Brochures/Handouts.	<b>0.531</b>	0.041
12. Fish clerk.	0.285	0.318
13. Bait and tackle shop	0.217	0.356
14. Community center	0.318	<b>0.407</b>
15. Consumer advisory groups	<b>0.626</b>	0.015
16. Environmental groups	<b>0.591</b>	0.000
17. Books (i.e. health or cook books)	<b>0.438</b>	-0.248
18. Health newsletter	<b>0.550</b>	-0.405
<b>Eigenvalue</b>	3.212	1.339
<b>% Of Variance (per factor)</b>	17.845	7.438

<sup>a</sup> **Bold** indicates factor loadings exceeding 0.4 which are defined as “high” factor loadings





**Figure 3.6** Scree plot for the factor analysis of the variable ‘sources of seafood information’ items

## **Chapter 4**

### **RESULTS**

#### **4.1 Descriptive statistics**

The demographic descriptions of the respondents can be found in Table 4.1. Among the 1062 respondents, gender was relatively evenly distributed. A majority of respondents were between the ages of 25 - 54 years. Participants were primarily White/Caucasian with some college education or a college degree. Twenty-six percent of the cohort reported an income in the range of \$30,000 to \$49,999.

The location of residence indicated almost equal numbers of people were located in either inland or coastal states. When the Great Lake states were separated out and included with coastal states (Water State), a majority of the respondents (69.3%) were found to live in a state bordering water. Regional residence based on census regions shows the South having the highest residency rate (34.2%) and the Northeast as the lowest with only 16.7%.

Only 19.2% of the survey respondents reported eating seafood in the recommended amount of at least two times per week. The majority (68.5%) of participants reported consuming some seafood but did not meet this recommended amount. The remaining survey responses indicated no current fish consumption (12.2%).

**Table 4.1 Demographics of respondents (N = 1062)**

DEMOGRAPHIC		FREQUENCY	PERCENT
Gender	Male	556	52.4
	Female	506	47.6
Age (years)	18 – 24	160	15.1
	25 – 34	198	18.6
	35 – 44	235	22.1
	45 – 54	192	18.1
	55 – 64	131	12.3
	65 – 74	89	8.4
	75 and older	57	5.4
Education	Less than High School	17	1.6
	High School or GED	215	20.2
	Associate/Technical Degree	91	8.6
	Some College	339	31.9
	College Degree	267	25.1
	Post Graduate Degree	126	11.9
	Prefer not to answer	7	0.7
Ethnicity	White/Caucasian	886	83.4
	Black/African American	72	6.8
	Spanish/Hispanic/Latino	29	2.7
	Asian	34	3.2
	Pacific Islander	2	0.2
	Native American	6	0.6
	Prefer not to answer	18	1.7
	Other	15	1.4
Income	< \$29,999	240	22.6
	\$30,000 - \$49,999	272	25.6
	\$50,000 - \$69,999	208	19.6
	\$70,000 - \$89,999	119	11.2
	\$90,000 - \$110,000	86	8.1
	> \$110,000	87	8.2
	Prefer not to answer	50	4.7

**Table 4.1 Continued**

DEMOGRAPHIC	FREQUENCY	PERCENT
State Border <sup>a</sup>		
Inland state	567	53.4
Coastal state	495	46.6
Water States <sup>b</sup>		
Inland state	326	30.7
Water state	736	69.3
Census Region <sup>c</sup>		
Northeast	177	16.7
Mid West	279	26.3
South	363	34.2
West	243	22.9

<sup>a</sup> Based on Table 2.1

<sup>b</sup> Water States = Coastal states + Great Lake states

<sup>c</sup> Based on United States census data for 2006 (21)

## 4.2 Seafood consumption cross tabulations

Table 4.2 displays cross tabulations between the three seafood consumption groups and several demographic variables. When demographic variables were cross tabulated with the three consumption groups (CSE-R, CSE-NR & NONE), seafood consumption did not differ significantly by gender nor by ethnicity. Age was significant ( $p < 0.000$ ) with older people eating more seafood. A similar pattern was found in the results for education and income with both being positively associated with seafood consumption ( $p < 0.000$ ).

When the 'State Border' was cross tabulated with seafood consumption there was no significant difference in consumption between 'Inland and Coastal States'. However, when the 'Great Lake States' were combined with the 'Coastal

States' into 'Water States', the 'Water States' had significantly higher consumption of recommended seafood amounts than 'Inland States' ( $p = 0.046$ ).

Seafood consumption also differed significantly among census regions ( $p = 0.010$ ). The Northeast had the highest percentage of CSE-R responses (26.0%), while the West had the highest percentage of those in the NONE group (16.0%). In all four regions, the CSE-NR groups were the largest, ranging from 62.7 - 75.6%.

**Table 4.2 Cross Tabulations between consumption groups and demographic variables**

	NONE	CSE-NR	CSE-R	P value (n)
	<b>Row %</b>			
<b>GENDER (N = 1062)</b>				0.119
Male	11.0	68.2	20.9	(556)
Female	13.6	69.0	17.4	(506)
<b>AGE (N = 1062)</b>				< 0.000
18-34 years old	17.3	69.0	13.7	(358)
35-64 years old	10.5	69.6	19.9	(427)
>= 65 years old	8.3	66.4	25.3	(277)
<b>EDUCATION (n = 1055)</b>				< 0.000
HS or less	18.5	70.3	11.2	(232)
Some college	13.5	68.8	17.7	(430)
College/post-grad	6.6	67.9	25.4	(393)
<b>ETHNICITY (n = 1029)</b>				0.252
White	12.2	68.6	19.2	(886)
Black/Hispanic	10.9	73.3	15.8	(101)
All other	14.3	54.8	31.0	(42)
<b>INCOME (n = 1012)</b>				< 0.000
< \$29,999	15.4	72.1	12.5	(240)
\$30,000 - \$50,000	13.6	72.4	14.0	(272)
> \$50,000	8.8	67.0	24.2	(500)
<b>STATE BORDER (N = 1062)</b>				0.088
Inland State	13.4	69.7	16.9	(567)
Coastal State	10.9	67.3	21.8	(495)
<b>WATER STATE (N = 1062)</b>				0.046
Inland	14.7	69.9	15.3	(326)
Water State	11.1	67.9	20.9	(736)
<b>CENSUS REGION (N = 1062)</b>				0.010
Northeast	11.3	62.7	26.0	(177)
Mid West	10.8	75.6	13.6	(279)
South	11.3	67.5	21.2	(363)
West	16.0	66.3	17.7	(243)

Appendix C displays the additional cross tabulation tables. Seafood consumption showed significance in all statements of both the self-reported seafood knowledge and purchasing decision factor inquiries ( $p < 0.000$ ) (Table C.1). Each of the self-reported knowledge items was positively associated with seafood consumption. The more knowledge the respondents claimed, the more seafood they ate.

When the focus of the same statements used for self-reported knowledge changes to become a decision factor in the purchasing of seafood, a similar positive relationship with seafood consumption was noted (Table C.2). In a majority of these factors, as the importance progressed from ‘not important’ to ‘very important’, proportions of CSE-R increased. On the other hand, all statements had a larger proportion as ‘not important’ in the NONE consumption group compared to any of the other responses.

There was a significant difference in seafood consumption between those responding with correct or incorrect agreement to all but two knowledge statements ( $p < 0.01$ ) (Table C.3). In general there was a positive association between knowledge and seafood consumption. Among the knowledge items significantly related to seafood consumption, the percentage of those with correct answers who are CSE-R is higher than the percentage CSE-R for those with the wrong answer. For example, in the item of ‘Oily fish, like tuna and salmon, are a good source of omega-3 fatty acids’, 22.1% of the correct response was in the CSE-R group. The incorrect response had a lower percentage of CSE-R respondents (13.5%). Reverse results were found in percentages of those with correct and incorrect answers in the NONE category.

Seafood consumption showed significance with responses to all but one of the attitude statements with all significant p-values  $< 0.01$  (Table C.4). Overall patterns show the more important the item is to people, the more seafood they eat. For example, when responding agree-disagree to the statement “I feel comfortable buying and preparing seafood,” a greater percentage of the ‘strongly agree’ responses were in the CSE-R group (32.4%) compared to the percentage of those in the ‘strongly disagree’ CSE-R group (3.6%).

The amount of seafood consumption was significantly associated with the most frequent seafood consumption location ( $p < 0.000$ ) (Table C.5). The percentage of those who prepare seafood at home in the CSE-R group is higher than the percentage of those who eat seafood in a restaurant (29.4% vs. 13.6%). On the other hand, eating seafood in a restaurant (86.4%) was significantly higher than preparation at home (70.6%) for the CSE-NR group. The NONE consumption group was not included in this cross tabulation since they do not eat seafood anywhere.

There were 18 possible sources of information about seafood and responses of either ‘yes’ or ‘no’ indicated whether or not the respondent used the item as a current source of seafood information. Thirteen of the 18 were significantly associated with the quantity of seafood consumed ( $p < 0.05$ ) (Table C.6). In these statements, responses in the ‘yes’ category had significantly more of the CSE-R consumption group and less of the NONE group than responses in the ‘no’ category. Most, but not all, of these statements had higher percentages in the ‘no’ category compared to ‘yes’ for the CSE-NR group.

Seafood consumption did not show significance with a person’s status of being or not being the primary shopper for the household (Table C.7). Seafood



consumption was significant with whether or not a person was the decision maker for where to dine out ( $p = 0.002$ ) (Table C.8). A higher percentage of those who decide where to dine out are in the CSE-R group than those who do not decide dining location. The ‘no’ response had the largest percentage of the NONE group relative to ‘yes’ and ‘shared’.

### **4.3 Linear regression**

Table 4.3 displays the linear regression results of seven models used in the analyses. Of all the demographic variables, age and education maintained a strong significance with seafood consumption in all regression models. However coefficients and significance declined for both variables with an increase in the number of factors used in the regression. Residents of the Northeast and South census regions ate significantly more seafood than do residents of the West ( $p < 0.05$ ).

The attitude of trust and knowledge of health indices showed significant positive relationships with seafood consumption when only the demographics were controlled ( $p < 0.000$ ). But these two relationships declined and were lost when additionally controlling for self-reported knowledge and purchasing decision items. Self-reported knowledge maintained a high significance ( $p < 0.000$ ) with seafood consumption in all models in which it was incorporated. This variable also had relatively high coefficients compared to others used in all models. Expert and publication sources of information about seafood showed significance ( $p < 0.01$ ) with seafood consumption.

**Table 4.3 Results of linear regression models**

Variable	Model 1 B (t)	Model 2 B (t)	Model 3 B (t)	Model 4 B (t)	Model 5 B (t)	Model 6 B (t)	Model 7 B (t)
Adjusted R <sup>2</sup>	0.055	0.069	0.087	0.161	0.167	0.172	0.173
Intercept	2.054*** (12.569)	1.645 *** (8.667)	1.689 *** (8.980)	1.526 *** (8.421)	1.494 *** (8.259)	1.513 *** (8.386)	1.445 *** (7.752)
Gender (male)	0.006 (0.147)	-0.006 (-0.150)	-0.033 (-0.853)	-0.008 (-0.228)	-0.017 (-0.448)	-0.019 (-0.512)	0.000 (0.007)
Education	0.060 *** (3.877)	0.063 *** (4.114)	0.054 *** (3.510)	0.046 ** (3.153)	0.048 ** (3.272)	0.044 ** (2.966)	0.043 ** (2.900)
Income	0.113 ** (3.214)	0.112 ** (3.178)	0.092 ** (2.631)	0.065 (1.918)	0.064 (1.896)	0.072 * (2.134)	0.076 * (2.226)
Age	0.004 *** (3.717)	0.004 *** (3.973)	0.004 ** (3.202)	0.003 ** (2.750)	0.003 ** (2.419)	0.002 * (1.969)	0.002 * (2.103)
Water state	0.065 (1.523)	0.064 (1.510)	0.072 (1.705)	0.057 (1.417)	0.058 (1.430)	0.055 (1.378)	0.051 (1.267)

\* p < 0.05    \*\* p < 0.01    \*\*\* p < 0.001

**Table 4.3 Continued**

Variable	Model 1 B (t)	Model 2 B (t)	Model 3 B (t)	Model 4 B (t)	Model 5 B (t)	Model 6 B (t)	Model 7 B (t)
Region	<i>df=3,</i> <i>1051,</i> <i>F=2.675</i> <i>p =0.046</i>	<i>df=3,</i> <i>1049,</i> <i>F=2.487</i> <i>p =0.059</i>	<i>df=3,</i> <i>1048,</i> <i>F=2.422</i> <i>p =0.065</i>	<i>df=3,</i> <i>1047,</i> <i>F=2.916</i> <i>p =0.033</i>	<i>df=3,</i> <i>1046,</i> <i>F=2.525</i> <i>p =0.056</i>	<i>df=3,</i> <i>1045,</i> <i>F=2.527</i> <i>p =0.056</i>	<i>df=3,</i> <i>1041,</i> <i>F=2.481</i> <i>p =0.060</i>
Northeast	0.129 * (2.069)	0.128 * (2.062)	0.129 * (2.099)	0.148 * (2.502)	0.139 * (2.360)	0.136 * (2.314)	0.134 * (2.285)
Midwest	0.042 (0.779)	0.047 (0.874)	0.033 (0.619)	0.040 (0.779)	0.038 (0.752)	0.036 (0.707)	0.037 (0.733)
South	0.124 * (2.424)	0.120 * (2.357)	0.108 * (2.138)	0.107 * (2.217)	0.099 * (2.049)	0.100 * (2.073)	0.100 * (2.085)
West	Reference						
Attitude - Trust		0.133 *** (4.168)	0.120 *** (3.801)	0.070 * (2.268)	0.050 (1.598)	0.056 (1.783)	0.057 (1.802)
Knowledge - Health			0.278 *** (4.677)	0.135 * (2.290)	0.109 (1.836)	0.097 (1.636)	0.100 (1.692)
Self-reported knowledge				0.268 *** (9.629)	0.234 *** (7.774)	0.217 *** (7.094)	0.217 *** (7.048)
Purchasing decision items					0.079 ** (2.958)	0.070 ** (2.624)	0.073 ** (2.709)
Sources of information						0.280 ** (2.698)	0.277 ** (2.662)
Main food purchaser							<i>df=2,</i> <i>1041,</i> <i>F=0.816</i> <i>p =0.442</i>
No							0.039 (0.566)
Yes							-0.040 (-0.862)
Shared	Reference						
Decide dining location							<i>df=2,</i> <i>1041,</i> <i>F=2.109</i> <i>p =0.122</i>
No							-0.021 (-0.203)
Yes							0.083 * (1.989)
Shared	Reference						

\* p < 0.05 \*\* p < 0.01 \*\*\* p < 0.001

## **Chapter 5**

### **DISCUSSION**

The discussion section will be structured to address each of the research questions individually. These questions were first identified on page 1 in Chapter 2. Recall for the cross tabulations, the dependent variable of consumption consisted of three groups, CSE-R, CSE-NR and NONE. In the linear regression the original four groups were applied, i.e. the FSE and NSE groups were used instead of the collapsed NONE group.

#### **5.1 How do age, gender, education, household income, ethnicity, and location of residence affect the quantity of seafood consumption?**

The primary investigation for my study was one of only two recent studies found looking at the general US population with regards to seafood consumption. Most of the latest studies occurred in other countries and limited the respondents to a particular subset of the population, such as the primary food purchaser or shopper of a household or only those who consume fish (13 - 19). The other US study, while noting demographics similar to the US population, provides limited data on the demographics (5). As previously described by primary investigators of my study, overall demographics were comparable to the US census data for the same time period (20). Slight differences were noted in education level, income and ethnicity (20).

Results of my study demonstrated those who were older, with a higher education and living in either the Northeast or South census regions were more likely to consume seafood when looking at all four consumption groups. Throughout all

linear regression models, age and education were the only constant significant predictors of seafood consumption among the demographic variables. Both variables in the cross tabulations also showed a change as age and education increase. The percentage of those in the > 65 group who were CSE-R was higher than percentages in the other age ranges. Percentages were lower in the same age group compared to younger age categories for the CSE-NR group. This was consistent with several other studies finding age (5, 13, 16, 19) and education (5, 19) related to the frequency of eating seafood. However the effect of an increase in age was minimal in my report, suggesting the influence of other variables coinciding with age. A study by Olsen (16) found the increase in consumption frequency of older consumers to be mediated by attitude, health involvement and factors related to convenience of seafood (e.g. the ease of purchasing and preparing). An older age was found to be a factor in consuming lean fish, but not fatty or processed types of fish, in another study of women aged 45 - 69 (17). My study did not take the type of fish into account with regard to consumption frequency.

Compared to age, education had a stronger effect on seafood consumption in the regression analyses. While remaining significant, the predictive value declined as variables were added to each model. Cross tabulation results displayed a similar pattern as explained above for age. Each increased education category had a higher percentage of CSE-R and a lower percentage of CSE-NR. Results from other studies with regard to education and seafood consumption were difficult to compare to this study. One study of seafood consumers who were primary shoppers for a household found education to be significant with the intention to eat fish, but not with actual fish consumption frequency (13). Education was not significant in a cohort of women

aged 45 - 69 (17). My population's education level was slightly higher than US census data, which may influence the level of seafood consumption according to the primary investigators (20). Age and education may play a role in consumption either through experience with buying or preparing seafood or increased knowledge about the connection of health and certain eating patterns.

Consumption was also positively associated with income in both the cross tabulation and early regressions. However when self-reported knowledge and purchasing decision factors were controlled for in the regressions, this significance was lost. In the only other survey identified for a US population, income did not affect consumption frequency (5). Authors of a study involving only those who consume fish found those with higher incomes ate more seafood compared to the lowest income level (14). When the type of fish consumed was a variable in another study, there was a negative correlation between income and the consumption of lean and processed fish, but was no relationship at all with fatty fish (17). However, those results were for a cohort of only women who eat seafood, and are from a country with a strong tendency to consume seafood (17).

Neither gender nor ethnicity had an impact on the amount of seafood consumed in the regression analyses, nor were significant when comparing the three seafood groups in the cross tabulations, which is similar to findings noted in the other US study (5). Only two other studies looked at gender and found it to be a positive influence on consumption with females consuming more seafood than males (13, 14). However, those studies were from the same cohort and limited to primary shoppers resulting in a higher percentage of female respondents. As for ethnicity, the previous article by Hicks et al. (20) mentioned a lower representation of African American and

Hispanic respondents compared to the US census data (20). This lack of minority responses may explain the lack of impact by ethnicity on seafood consumption. While Storey et al. (5) identified ethnicity as a variable in their article, the data provided were limited and a comparison to my study was not possible.

Living in a state bordering either an ocean or a Great Lake increased the likelihood of eating more seafood when using data from the regressions. However when other independent variables were controlled for in the regressions, this significance to residing near water was lost. In the cross tabulations, the percentage of those living near water (Water state) who are CSE-R was higher, and CSE-NR was lower than the percents living inland. Living in a coastal region was also found to be significant by Verbeke et al. (13). Trondsen et al. (17) found a similar residential connection to seafood consumption. However that study divided consumption into types of fish (lean, fatty or processed). The type of fish predominantly consumed varied by location, which was attributed to local and historical availability of the types of fish (17). My study did not look at types of seafood preferred based on consumption group or location of residence.

Of the US census regions the West had a larger proportion of non-consumers of seafood. Seafood consumption was significantly higher in the Northeast and South regions compared to the West when looking at all four consumption groups in the regressions. These two regions also had the highest percentages of the CSE-R consumption group in the cross tabulation results. As mentioned earlier, living in a state bordering water was not significant with seafood consumption in the final regressions.

## **5.2 How do consumer self-reported knowledge and decision factors impact the quantity of seafood consumption?**

Recall the Self-reported knowledge (SRK) in my study meant respondents' reporting of their perceived knowledge for each item. SRK showed a consistent and strong positive effect on seafood consumption among the four consumption groups even when controlling for all other factors in the regression. When it was entered in the regression the impact of income on consumption became insignificant. SRK also reduced the effect of 'knowledge' of the health benefits of eating seafood and the 'attitude' of trust in seafood information, which are two regression indices discussed in sections 5.3 and 5.4 below.

Recall purchasing decision items were the same as those listed in the SRK questions. However in this case, respondents indicated the level of importance each had on their decisions to purchase seafood. Purchasing decision items also showed a positive, but lower, effect on the amount of seafood eaten in the regression analyses with all four consumption groups.

Hicks et al. (20) discussed response frequencies for the entire study population. Seafood quality, handling and preparation were identified as the most important issues in purchasing decisions. However these items had much lower ratings when it came to the SRK responses in the overall population. Self-reported knowledge in the health benefits of seafood had the highest reported percent of those identifying themselves as knowledgeable or very knowledgeable (41%) (20). Using the three most important purchasing factors (seafood quality, handling and preparation) to investigate the same items in the cross tabulations with SRK showed these SRK items were significant to consumption.



A few of the background studies measured the importance of similar items to the SRK topics. Verbeke et al. (13) used a variable identified as ‘perceived behavioral control’, which included items such as judging the quality of seafood, difficulty in preparing and the ability to select seafood. Using the Theory of Planned Behavior described earlier in this report, perceived behavioral control was positively correlated with the intention to eat seafood, and together with intention had a significantly positive effect on the consumption frequency of seafood. The focus of a study by Rortveit et al. (15) was the idea of a ‘consideration set’, the number of choices a person identifies when making a decision. Some items used in the ‘consideration set’ being tested were similar to the SRK such as familiarity with seafood species, forms (e.g. fresh or frozen) and ways to prepare seafood. The size of the considerations set was positively correlated with the frequency of fish consumption in that study (15). These examples support the idea of the importance of self-reported knowledge to the increased consumption of seafood. The significance reported with the regression in my report, along with the low overall confidence level found in the general population of by the primary authors (20), might provide a potential avenue for increasing seafood consumption.

### **5.3 How do correct responses to knowledge statements impact the quantity of seafood consumption?**

The actual knowledge statements found in the regression index relate to a person’s knowledge of the health aspects of seafood. Recall these are different statements than used in the SRK. Actual knowledge had a positive impact on seafood consumption when demographics and attitude were the only other indexes used in the regression with all four consumption groups as the dependent variable. Once SRK

was included, both the level of effect and the amount of significance were reduced. With all variables included in the final regression, knowledge about seafood health aspects was not significant in predicting seafood consumption. Four of the knowledge statements used in this index scored the four highest percent correct in the analysis of the entire study population by the primary investigators (20). But even so, all scores were below the 80% cutoff identified as subject mastery, indicating a lack of knowledge about seafood in general. In the cross tabulations of these four items, the percentage of those in the 'correct' response who were CSE-R was higher than the percentage of those in the 'incorrect' response category who were CSE-R. A similar pattern was found with the CSE-NR consumption group, indicating knowledge of the health benefits of eating seafood might not be an important difference between those eating enough and not meeting recommendations.

The idea of knowledge of health was measured in several other studies, but with varying comparisons and results. In the earlier US study by Storey et al. (5), participants were asked about their awareness of 'health effects related to fish consumption'. Being female, white, having a higher income and education level improved the likelihood a respondent was aware of the relationship between fish and health (5). Similarly in my report all of these variables except ethnicity were significant with seafood consumption when the regression only included demographics, attitude (discussed later in the report) and knowledge. In another study 'food health awareness' did not affect intention or consumption frequency, but indirectly improved both through all three determinants of intention to eat seafood (attitude, subjective norm and perceived behavioral control) (13). The second study involving the same cohort as that study used similar statements to my report to

determine a respondent's beliefs about the health aspects of fish (14). Their statements were based on evidence-based research such as fish containing vitamin D for bone health and omega-3 for heart health. Their results indicated the perception of fish being healthy tended to be stronger in respondents who were women, older in age, and lower education. Those in the lower education group had a stronger perception of seafood being healthy, but incorrectly answered questions about specific nutrients in fish (Vitamin D, omega-3 fatty acids and fiber) (14). While knowledge about the health benefits of seafood may not be directly involved in the consumption frequency of seafood, it appeared to somehow have an indirect connection. Knowledge was related to a few similar demographic variables found in several studies discussed earlier in this section, such as age and gender, but was not found to be directly related to consumption frequency. However these demographic variables were related to how often a person ate seafood.

#### **5.4 How do attitude statement responses in the four individual statement categories (Trust, Environmental, Purchasing, and Health) influence the quantity of seafood consumption?**

In the factor analysis the only category to factor out of all attitude statements was that of trust. Statements in this item centered around the idea of a consumer trusting information presented on seafood from sources such as the government, media and environmental groups. The attitude of trust significantly influenced the consumption of seafood when demographics and knowledge were included in the regression using all four consumption groups. Similar to the knowledge variable, once SRK was added as a variable, the effect was reduced, but still significant. Subsequent runs adding the remaining variables caused the attitude of trust to become insignificant in predicting seafood consumption.

The environmental category included one statement about the problem of overfishing. Cross tabulation results were significant but patterns were not easily defined.

Two of the purchasing category statements “I feel comfortable buying and preparing seafood” and “ It is easy to judge the freshness of seafood” showed a clear positive association with seafood consumption in the results from the cross tabulations using three consumption groups. Both statements had an increased percentage of those in the ‘strongly agree’ category who were CSE-R compared to any of the other response choices. In comparing the percentage of responses in the ‘strongly agree’ who were CSE-NR to the percent of ‘agree’ responses being in the CSE-NR group, both items showed a decline in agreement for this consumption group. Of interest here was the similarity of these items to concepts found in the SRK statements.

The same comparison can be used between the health category statement “I think seafood is good for your health” and the items found in the knowledge of health aspects index previously discussed. This item was also significant in the cross tabulations using the three consumption groups.

Attitude was examined in several of the other studies as well. Verbeke et al. (13) found attitude influenced the respondent’s intention to eat fish, which in turn influenced frequency of seafood consumption. In that study attitude was measured with both evaluative and affective judgments. The evaluative statements were similar to several of my study’s attitude statements. The affective ideas were measuring a person’s satisfaction with the physical attributes of fish (e.g. taste, smell and bones) (13). In another study attitude was measured with how a person felt when eating seafood on 7-point Likert scales of bad vs. good, unsatisfied vs. satisfied and

unpleasant vs. pleasant (15). Results indicated attitude had a positive effect on set size and frequency of consumption. And attitude was a stronger predictor than knowledge of seafood consumption (15). In a third report, attitude measured using the statement “I am eating enough fish: was strongly associated with both lean and fat fish consumption (17). While not the same measure of attitude as found in my survey, these results highlight the importance attitude in general to increasing seafood consumption.

### **5.5 How does consumption location (home prepared or restaurant/fast food) affect seafood consumption within the CSE-R and CSE-NR groups?**

Since only those eating fish have a consumption location, the cross tabulations for this analysis were done with only the CSE-R and CSE-NR groups as the dependent variable. As the results showed in the cross tabulation analysis, those eating enough seafood to meet the recommendations consume significantly more seafood at home than those eating some seafood but not enough. Seafood eaters not meeting recommendations tend to eat more of their seafood meals in restaurants of various types. The primary authors suggest perhaps this is related to their knowledge level or ability to prepare seafood (20).

Only one other study looked at dining location as a variable (14). The authors of that study noted when dining out, women chose fish more often than men. Women also ate fish at home more often (14).

### **5.6 How do either current or preferred sources of seafood information influence the quantity of seafood consumption?**

When controlling for all other variables, the ‘expert and publication’ current sources of seafood information index was significant in the regression. Each

of the individual items of this index was also significantly associated with seafood consumption, as previously mentioned in the results of the cross tabulation analyses using the three consumption groups. However, when looking at the study population as a whole, media was the most used source of information (20). Family and friends and the Internet were also used by at least one-third of the respondents. Interestingly, the use of family and friends as a source of seafood information was not significant with consumption in the cross tabulations analysis. Most of the sources found in the index for my report's regression were only used by about 15% of the total respondents (20). Health newsletter was slightly higher with 23% usage (20).

Preferred sources ranked media and Internet highest for a total of 44% (20). All other sources were below 10% as favored ways to get information. Because of the survey response design for this question, further analysis beyond what was completed by the primary authors was not performed.

A few studies also looked at messages and sources of information. In one study identifying an 'external social norm' including sources such as government, the food industry and advertising, the importance of this reference group was less than the internal social norm, or people in the respondents' inner social setting (13). Based on their findings the authors suggest the promotion of consumption by industry or public health campaigns may be unsuccessful due to consumers unwillingness to accept their messages. They also propose experts such as doctors and dietitians may be a better source of messages to promote seafood consumption (13). Results and remarks from that study support findings in my report previously noted in that friends and family are widely used for information but do not influence consumption. Whereas experts such

as physicians and dietitians may influence the amount of seafood eaten but are not used for information by most consumers.

A second study suggests product-based nutrition information such as “fish is healthy” was more common in the past and is better at affecting older consumers. Nutrient-based information such as “fish contains omega-3 fatty acids” is more prominent now and more ideal for younger consumers (14). Preferred sources of information may be different among age groups as noted by a third report (16). Therefore, promoting consumption may require the use of multiple sources of information (16). A further analysis of sources of information compared to age or gender may produce more insight into the best starting place for messages to be created.

#### **5.7 How do either status as primary shopper or decision maker of dining location influence the quantity of seafood consumption?**

The results of the cross tabulations indicated no significant difference in seafood consumption between respondents who were or were not the primary shopper for a household when the three consumption groups were used as the dependent variable. The regression analysis with four consumption groups also shows being the main food purchaser was not significant in predicting the amount of seafood eaten when all other variables were taken into consideration. Since many of the studies reviewed for my report only included the primary shopper of the household there are no similar statistics to compare these results.

If a person was the decision maker for the location of where to dine out, they were more likely to consume the recommended amount of seafood in the cross

tabulations. In the regression, responding ‘yes’ was significant only when compared to those indicating the responsibility was ‘shared’.

## **5.8 Limitations**

One limitation was the non-random sampling used in this Internet survey limited the ability to generalize findings to the whole US population. As previously discussed however, demographics were noted by Hicks et al. (20) to be similar to the census data of the same time period. And unlike many of the previous studies, specific eating patterns were not set as criteria for respondents. Therefore, despite this limitation significant findings may prove beneficial to promoting seafood consumption to those not meeting dietary guideline amounts.

Non-response bias may be due to a lower literacy or education level among those not responding. Additionally the method of survey delivery may be the reason for the higher education level found in respondents compared to US census data, as they may be more knowledgeable about computers.



## **Chapter 6**

### **CONCLUSIONS**

In this secondary analysis of a nationwide Internet survey, seafood consumption was reviewed through statistical regressions including indexes from factor analyses to identify variables influencing overall consumption. Individual items from variables such as demographics, attitudes, knowledge and self-reported knowledge (SRK) were compared to the CSE-R, CSE-NR and NONE consumption groups in the cross tabulations in order to identify patterns indicating significance with consuming or not consuming enough seafood.

Results of my study indicated self-reported knowledge to be the most significant factor in influencing seafood consumption in general. Patterns in the individual cross tabulations of the SRK items show those consuming the recommended amount of seafood (CSE-R) perceive themselves to be more knowledgeable than those not consuming enough seafood (CSE-NR) in areas such as safe seafood handling, preparation, the health benefits of eating seafood and seafood quality. However claiming to be ‘knowledgeable’ is a subjective measure based one’s interpretation of the item meaning, not on actual ability or knowledge. The perception of being knowledgeable is not necessarily an indication of a person’s actual knowledge. Though in theory, if SRK could be equated to actual knowledge, then increasing the SRK of items in that variable could lead to an increase in people meeting the DGA for seafood consumption.

Another key point to mention is the fact that several items in the SRK variable are not necessarily knowledge but skills, related more to ability. Items such as safe seafood handling, preparation, selection and storage are all skills requiring development.

When looking at responses from the general population of the primary study, items of seafood quality, safe handling, preparation and storage were the most important factors in purchasing decisions. Focusing on these topics may be the most influential method to increase consumption in the group not eating the recommended amounts of seafood. Any education or messages developed for these purposes will need to reach a broad audience, since there is no simple way to determine which consumers in an audience are eating recommended amounts and those not meeting recommendations.

Preparation of seafood may be the simplest skill to address. There are multiple avenues for providing tips and suggestions for preparing seafood meals. Possible ways to increase this skill may include various types of information on quick and easy preparation methods such as recipes on packages of seafood or cards displayed at point of purchase locations. Methods for making a food more convenient to consume may help to encourage consumption in the current fast-paced lifestyle. Cooking classes and demonstrations can also add to the actual preparation knowledge of a consumer. It might be beneficial to pay special attention to commonly eaten species for a particular area of residence. Seafood quality, handling and storage issues could be addressed alongside any of the preparation methods mentioned above. Additional information on packages to address safe storage and handling is one possibility. Cooking classes are ideal for passing on this information as well.

Based on other findings in my study, to further promote seafood consumption, increasing the actual knowledge items of contaminants, health benefits versus risks and the origins of seafood (wild-caught vs. farm-raised) would be beneficial. While actual knowledge may not directly affect how much a person consumes, increasing a person's overall knowledge about a food item will increase their awareness of the product. Awareness is important for a food item to even be considered as a potential meal component.

Identifying the skills and knowledge needing to be improved is the easier part of the equation. Finding the methods to promote these may prove more difficult. The media and Internet were preferred sources of information for the general population. The Expert/Publication index was important in predicting consumption of seafood. Perhaps finding a way to put these two groups of information sources together may prove to be the best option. One potential idea could include public service announcements, as ads on websites or other media venues are an option but require funding. Education materials distributed by dietitians and physicians may also be helpful, especially if these 'experts' in promoting healthy lifestyles create them.

One barrier to promotion will be in the funding of these skill-building plans. Other barriers not discussed in my report may be in the risk versus benefit dilemma seafood consumption. The question arises "can information promoting consumption be more productive than the messages people are hearing on the risks?"

Future research will be needed to test the assumption that SRK is identifying and measuring actual knowledge. If this assumption proves correct then items of SRK most important in purchasing decisions should be the focus of future messages.

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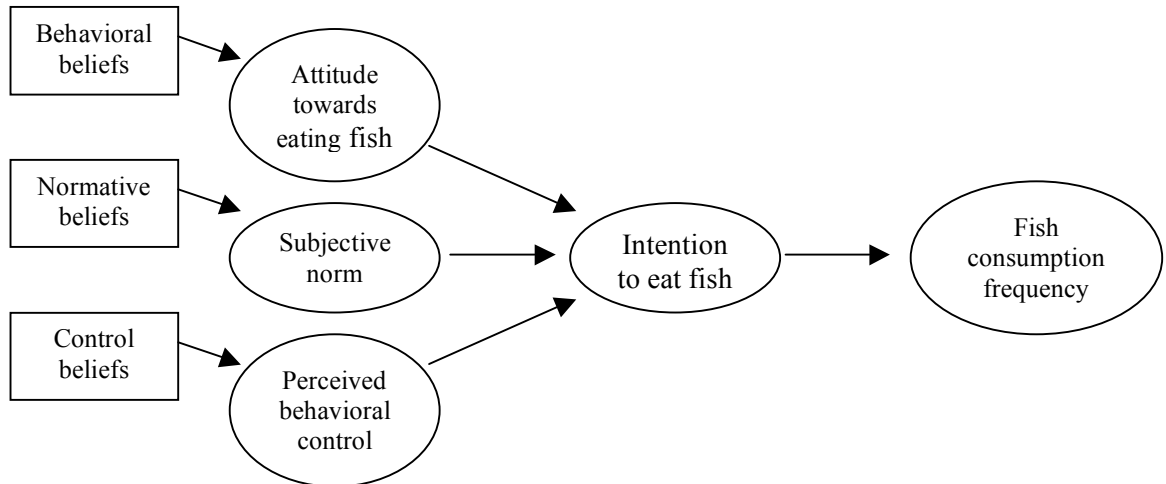
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**Appendix A**

**CONCEPTUAL FRAMEWORK OF THE THEORY OF PLANNED  
BEHAVIOR**

### Conceptual framework of the Theory of Planned Behavior (13)



- Fish consumption frequency
  - Outcome measure
  - Directly determined by intention
- Intention to eat fish
  - Self determined instructions for behavior
  - 3 Independent determinants of intention
    - Attitude
    - Subjective norm
    - Perceived behavioral control
- Attitude
  - Positive or negative evaluation
  - Influenced by behavioral beliefs: subjective likelihood the behavior will produce the desired outcome
- Subjective norm
  - Social norm
  - Influenced by normative beliefs: perceived social pressure - important people will either approve or disapprove of the behavior
- Perceived behavioral control
  - Perceived ease or difficulty in performing the behavior
  - Influenced by control beliefs based on past experience or experience of others



**Appendix B**  
**INTERNET SEAFOOD SURVEY**

## Seafood Survey

Seafood, for the purposes of this survey, is defined as all marine and freshwater finfish (i.e. tuna, shark, flounder) crustaceans (i.e. shrimp, crabs), mollusks (i.e. clams, oysters, mussels) and other forms of aquatic life (including squid, sea turtle, jellyfish, sea cucumber, sea urchin and the roe of such animals) other than birds or mammals, harvested for human consumption. Seafood can be wild or farm-raised, processed (i.e. canned, frozen, smoked, pickled, breaded) self-caught, or fresh from a market or restaurant.

1 Do you currently eat seafood?

☐ YES ☐ NO

SUBMIT

Survey Page 1

## Seafood Survey

2 Have you ever eaten seafood?

☐ YES ☐ NO

SUBMIT

Survey Page 2

## Seafood Survey

3 Does anyone in your household eat seafood? (Check all that apply)

- ☐ Spouse
- ☐ Children
- ☐ No one in my household eats seafood
- ☐ Other, Please Specify

4 What are your reasons for not eating seafood? (Check all that apply)

- ☐ Prior bad experience
- ☐ Price is too high
- ☐ Taste preference
- ☐ Household members do not eat seafood
- ☐ Allergic to seafood
- ☐ Currently pregnant or nursing
- ☐ Seafood safety concerns
- ☐ Consume a vegetarian diet
- ☐ There are young children in my household
- ☐ Not comfortable preparing seafood
- ☐ Not knowledgeable about buying seafood
- ☐ Environmental concerns
- ☐ Concern about overfishing (fishery management)
- ☐ Quality concerns
- ☐ Other, please specify

5 Do you feel there is some risk involved in eating seafood?

**SUBMIT**

Survey Page 3

## Seafood Survey

6 Do you feel the health benefits of eating seafood outweigh the risks?

7 If the risks were lower would you eat seafood?

SUBMIT

Survey Page 4

### Seafood Survey

- 8 Are you aware of the health advisory concerning mercury and seafood issued by the FDA and EPA?
- ☐ Not aware
  - ☐ Aware but not knowledgeable
  - ☐ Aware and knowledgeable
  - ☐ Aware and very knowledgeable

SUBMIT

Survey Page 5

### Seafood Survey

Here is a link to the health advisory. Please read the advisory before answering the next questions.

[FDA and EPA Public Health Advisory](#)

SUBMIT

Survey Page 6

### Seafood Survey

- 9 To whom does this advisory apply? (check all that apply)
- ☐ Women of child bearing age
  - ☐ Pregnant or nursing women
  - ☐ Everyone
  - ☐ Teenagers
  - ☐ Men
  - ☐ Elderly people

- ☐ Young children
- ☐ All women
- ☐ Not sure

---

10 What is the amount of seafood this advisory recommends for you to eat?

- ☐ Unlimited seafood
- ☐ 2 meals per week (up to 12 oz.)
- ☐ 1 meal per week
- ☐ No seafood

---

11 Does this advisory cause you to be more concerned about the mercury levels in seafood?

---

12 Do you feel this advisory encourages or discourages **you personally** to eat seafood?

- ☐ Encourages
- ☐ Discourages
- ☐ No effect

---

13 Which do you feel is a more healthy choice for pregnant women or developing children?

- ☐ Eating no seafood
- ☐ Eating 2 seafood meals per week
- ☐ Eating more than 2 seafood meals per week

Survey Page 7

---

### Seafood Survey

---

14 How long has it been since you last ate seafood?

- ☐ Less than 2 years ago

- ☐ More than 2 years ago

---

15 Does anyone in your household eat seafood? (Check all that apply)

- ☐ Spouse  
☐ Children  
☐ No one in my household eats seafood  
☐ Other, please specify

---

16 When you used to eat seafood how often would you eat it?

- ☐ More than twice a week  
☐ Twice a week  
☐ Once a week  
☐ A few times per month  
☐ Once a month  
☐ Once every 2-3 months  
☐ Less often than once every 3 months

SUBMIT

Survey Page 8

---

### Seafood Survey

---

17 Where did you most often eat seafood?

- ☐ Prepared at home  
☐ In a restaurant  
☐ Fast food or take-out

---

18 How did you usually obtain your seafood for home preparation? (Check all that apply.)

- ☐ Caught your own  
☐ Caught by friends or family  
☐ Purchased at a supermarket

- ☐ Purchased at a seafood specialty store
- ☐ Purchased at a club store (i.e. Sam's Club, BJ's Warehouse)
- ☐ Did not prepare at home
- ☐ Other, please specify



Survey Page 9

## Seafood Survey

19 What types of seafood did you eat? (Check all that apply)

- ☐ Clams
- ☐ Crab
- ☐ Shark
- ☐ Canned Tuna
- ☐ Shrimp
- ☐ King Mackerel
- ☐ Scallops
- ☐ Swordfish
- ☐ Cod
- ☐ Tilefish
- ☐ Flounder
- ☐ Squid (Calamari)
- ☐ Salmon
- ☐ Catfish
- ☐ Fresh Tuna

20 Please list any other types of seafood you ate.



## Seafood Survey

21 Why did you stop eating seafood? (Check all that apply)

- ☐ Less affordable
- ☐ My taste preference changed
- ☐ Household members taste preference
- ☐ Allergic to seafood
- ☐ Pregnant or nursing
- ☐ Seafood safety concerns
- ☐ Consume a vegetarian diet
- ☐ There are young children in my household
- ☐ Not comfortable preparing seafood
- ☐ Not knowledgeable about buying seafood
- ☐ Environmental concerns
- ☐ Concern about overfishing (fishery management)
- ☐ Prior bad experience
- ☐ Quality concerns
- ☐ Other, please specify

22 Do you feel there is some risk involved in eating seafood?

☐ YES ☐ NO

**SUBMIT**

## Seafood Survey

23 Do you feel the health benefits of eating seafood outweigh the risks?

☐ YES ☐ NO



---

24 If the risks were lower would you eat more seafood?

YES

NO

SUBMIT

Survey Page 12

---

### Seafood Survey

25 Have you heard anything that is positive about eating seafood?

YES

NO

SUBMIT

Survey Page 13

---

### Seafood Survey

26 What have you heard? Please be as specific as possible. If you cannot remember please type in N/A.

27 Where did you hear the positive information about seafood? (Check all that apply)

- ☐ Physicians
- ☐ Nutritionists/Dieticians
- ☐ Media (TV, radio, magazines, newspapers, etc.)
- ☐ Point of purchase information
- ☐ Workshops or seminars
- ☐ Internet
- ☐ In-store signs or demonstrations
- ☐ Family/Friends
- ☐ Government publications

- ☐ University/Extension
- ☐ Brochures/Handouts
- ☐ Fish clerk
- ☐ Bait and tackle shop
- ☐ Community center
- ☐ Consumer advocacy groups
- ☐ Environmental groups
- ☐ Books (i.e., health or cook books)
- ☐ Health newsletter
- ☐ Other, please specify



Survey Page 14

### Seafood Survey

28 Have you heard anything that is negative about eating seafood?

☐ YES ☐ NO



Survey Page 15

### Seafood Survey

29 What have you heard? Please be as specific as possible. If you cannot remember please type in N/A.

30 Where did you hear the negative information about seafood? (Check all that apply)

☐ Physicians

- ☐ Nutritionists/Dieticians
- ☐ Media (TV, radio, magazines, newspapers, etc.)
- ☐ Point of purchase information
- ☐ Workshops or seminars
- ☐ Internet
- ☐ In-store signs or demonstrations
- ☐ Family/Friends
- ☐ Government publications
- ☐ University/Extension
- ☐ Brochures/Handouts
- ☐ Fish clerk
- ☐ Bait and tackle shop
- ☐ Community center
- ☐ Consumer advocacy groups
- ☐ Environmental groups
- ☐ Books (i.e., health or cook books)
- ☐ Health newsletter
- ☐ Other, please specify



Survey Page 16

## Seafood Survey

In 2004, the Food and Drug Administration (FDA) along with the Environmental Protection Agency (EPA) jointly issued a health advisory offering guidance on the consumption of seafood due to the occurrence of mercury in seafood.

31 How would you rate your awareness of this advisory?

- ☐ Not aware
- ☐ Aware but not knowledgeable
- ☐ Aware and knowledgeable
- ☐ Aware and very knowledgeable

SUBMIT

Survey Page 17

## Seafood Survey

Here is a link to the health advisory. Please read the advisory before answering the next questions.

[FDA and EPA Public Health Advisory](#)

SUBMIT

Survey Page 18

## Seafood Survey

32 To whom does this advisory apply? (Check all that apply)

- ☐ Women of child bearing age
- ☐ Pregnant or nursing women
- ☐ Everyone
- ☐ Teenagers
- ☐ Men
- ☐ Elderly people
- ☐ Young children
- ☐ All women
- ☐ Not sure

33 What is the amount of seafood this advisory recommends for you to eat?

- ☐ Unlimited seafood
- ☐ 2 meals per week (up to 12 oz.)
- ☐ 1 meal per week
- ☐ No seafood



Survey Page 19

### Seafood Survey

34 Will this advisory cause you to eat seafood again?

☐ YES ☐ NO



Survey Page 20

### Seafood Survey

35 What types of seafood would you now eat? (Check all that apply)

- ☐ Clams
- ☐ Crab
- ☐ Shark
- ☐ Canned Tuna
- ☐ Shrimp
- ☐ King Mackerel
- ☐ Scallops
- ☐ Swordfish
- ☐ Cod
- ☐ Tilefish
- ☐ Flounder
- ☐ Squid (Calamari)
- ☐ Salmon
- ☐ Catfish
- ☐ Fresh Tuna
- ☐ Other, please specify

SUBMIT

Survey Page 21

### Seafood Survey

- 36 Does this advisory cause you to be more concerned about the mercury levels in seafood?

YES NO

- 37 Do you feel this advisory encourages or discourages **you personally** to eat seafood?

- ☐ Encourages
- ☐ Discourages
- ☐ No effect

SUBMIT

Survey Page 22

### Seafood Survey

- 38 If the FDA and EPA issued a health advisory stating there was **no risk** in consuming mercury through seafood, would you eat more of any of the following types of seafood? (Check all that apply)

- ☐ Clams
- ☐ Crab
- ☐ Shark
- ☐ Canned Tuna
- ☐ Shrimp
- ☐ King Mackerel
- ☐ Scallops
- ☐ Swordfish
- ☐ Cod
- ☐ Tilefish
- ☐ Flounder

- ☐ Squid (Calamari)
- ☐ Salmon
- ☐ Catfish
- ☐ Fresh Tuna
- ☐ Other, please specify



Survey Page 23

### Seafood Survey

39 To whom does this advisory apply? (Check all that apply)

- ☐ Women of child bearing age
- ☐ Pregnant or nursing women
- ☐ Everyone
- ☐ Teenagers
- ☐ Men
- ☐ Elderly people
- ☐ Young children
- ☐ All women
- ☐ Not sure

40 What is the amount of seafood this advisory recommends for you to eat?

- ☐ Unlimited seafood
- ☐ 2 meals per week (up to 12 oz.)
- ☐ 1 meal per week
- ☐ No seafood



Survey Page 24

## Seafood Survey

---

- 41 Does this advisory cause you to be more concerned about the mercury levels in seafood?

☐ YES ☐ NO

- 42 Do you feel this advisory encourages or discourages **you personally** to eat seafood?

- ☐ Encourages  
☐ Discourages  
☐ No effect

 SUBMIT

Survey Page 25

## Seafood Survey

---

- 43 If the FDA and EPA issued a health advisory stating there was **no risk** in consuming mercury through seafood, would you eat more of any of the following types of seafood? (Check all that apply)

- ☐ Clams  
☐ Crab  
☐ Shark  
☐ Canned Tuna  
☐ Shrimp  
☐ King Mackerel  
☐ Scallops  
☐ Swordfish  
☐ Cod  
☐ Tilefish  
☐ Flounder  
☐ Squid (Calamari)  
☐ Salmon  
☐ Catfish



- ☐ Fresh Tuna
- ☐ Other, please specify



Survey Page 26

## Seafood Survey

44 When was the last time you ate seafood?

- ☐ Today
- ☐ Yesterday
- ☐ 2-3 days ago
- ☐ 1 week ago
- ☐ 2 weeks ago
- ☐ 1 month ago
- ☐ More than one month ago

45 Does anyone in your household eat seafood? (Check all that apply)

- ☐ Spouse
- ☐ Children
- ☐ No one else in my household eats seafood
- ☐ Other, please specify

46 How often do you eat seafood at home or in a restaurant?

- ☐ More than twice a week
- ☐ Twice a week
- ☐ Once a week
- ☐ A few times per month
- ☐ Once a month
- ☐ Once every 2-3 months
- ☐ Less often than once every 3 months

SUBMIT

Survey Page 27

### Seafood Survey

47 Where do you most often eat seafood?

- ☐ Prepared at home
- ☐ In a restaurant
- ☐ Fast food or take-out

48 How do you usually obtain your seafood for home preparation? (Check all that apply.)

- ☐ Catch your own (recreational fishing)
- ☐ Caught by friends or family (recreational fishing)
- ☐ Purchase at a supermarket
- ☐ Purchase at a seafood specialty store
- ☐ Purchase at a club store (i.e. Sam's Club, BJ's Warehouse)
- ☐ Do not prepare at home
- ☐ Other, please specify

SUBMIT

Survey Page 28

### Seafood Survey

49 Which of the following types of seafood have you eaten? (Check all that apply)

- ☐ Clams
- ☐ Crab
- ☐ Shark
- ☐ Canned Tuna
- ☐ Shrimp

- ☐ King Mackerel
- ☐ Scallops
- ☐ Swordfish
- ☐ Cod
- ☐ Tilefish
- ☐ Flounder
- ☐ Squid (Calamari)
- ☐ Salmon
- ☐ Catfish
- ☐ Fresh Tuna
- ☐ None of the Above
- ☐ All of the Above
- ☐ Other, please specify

50 Has the amount of seafood you eat in or out of the home changed over the last 2 years?

- ☐ Decreased a lot
- ☐ Decreased a little
- ☐ No change
- ☐ Increased a little
- ☐ Increased a lot



Survey Page 29

### Seafood Survey

51 What are the reasons you decreased the amount of seafood you eat?  
(Check all that apply)

- ☐ Less affordable
- ☐ Change in my taste preferences
- ☐ Change in household member taste preferences
- ☐ Allergic to seafood

Based on health professional's advice

- ☐
- ☐ Currently pregnant or nursing
- ☐ Concern about seafood safety
- ☐ Consume a vegetarian diet
- ☐ Less availability
- ☐ Limited knowledge about preparing seafood
- ☐ Limited knowledge about buying seafood
- ☐ Environmental concerns
- ☐ Concern about overfishing (fishery management)
- ☐ Fish consumption advisories
- ☐ Health reasons
- ☐ Prior bad experience
- ☐ Quality concerns
- ☐ Other, please specify

SUBMIT

Survey Page 30

## Seafood Survey

52 What are the reasons you increased the amount of seafood you eat?  
(Check all that apply)

- ☐ More affordable
- ☐ Change in my taste preferences
- ☐ Change in household member taste preferences
- ☐ Currently pregnant or nursing
- ☐ Feel it is now more safe to eat
- ☐ More available
- ☐ More knowledgeable about preparing seafood
- ☐ More knowledgeable about buying seafood
- ☐ Improved environmental conditions
- ☐ Improved fishery management
- ☐ Based on health professional's advice

- ☐ Health benefits
- ☐ Improved quality
- ☐ Other, please specify

SUBMIT

Survey Page 31

### Seafood Survey

53 Do you feel there is some risk involved in eating seafood?

YES NO

SUBMIT

Survey Page 32

### Seafood Survey

54 Do you feel the health benefits of eating seafood outweigh the risks?

YES NO

55 If the risks were lower would you eat more seafood?

YES NO

SUBMIT

Survey Page 33

### Seafood Survey

56 Have you heard anything positive about eating seafood?

YES NO

## Seafood Survey

- 57 What have you heard? Please be as specific as possible. If you cannot remember please type in N/A.

- 58 Where did you hear the positive information about seafood? (Check all that apply)

- ☐ Physicians
- ☐ Nutritionists/Dieticians
- ☐ Media (TV, radio, magazines, newspapers, etc.)
- ☐ Point of purchase information
- ☐ Workshops or seminars
- ☐ Internet
- ☐ In-store signs or demonstrations
- ☐ Family/Friends
- ☐ Government publications
- ☐ University/Extension
- ☐ Brochures/Handouts
- ☐ Fish clerk
- ☐ Bait and tackle shop
- ☐ Community center
- ☐ Consumer advocacy groups
- ☐ Environmental groups
- ☐ Books (i.e., health or cook books)
- ☐ Health newsletter
- ☐ Other, please specify

SUBMIT

Survey Page 35

### Seafood Survey

59 Have you heard anything that is negative about eating seafood?

YES

NO

SUBMIT

Survey Page 36

### Seafood Survey

60 What have you heard? Please be as specific as possible. If you cannot remember please type in N/A.

61 Where did you hear the negative information about seafood? (Check all that apply)

- ☐ Physicians
- ☐ Nutritionists/Dieticians
- ☐ Media (TV, radio, magazines, newspapers, etc.)
- ☐ Point of purchase information
- ☐ Workshops or seminars
- ☐ Internet
- ☐ In-store signs or demonstrations
- ☐ Family/Friends
- ☐ Government publications
- ☐ University/Extension
- ☐ Brochures/Handouts
- ☐ Fish clerk
- ☐ Bait and tackle shop

- ☐ Community center
- ☐ Consumer advocacy groups
- ☐ Environmental groups
- ☐ Books (i.e., health or cook books)
- ☐ Health newsletter
- ☐ Other, please specify

SUBMIT

Survey Page 37

## Seafood Survey

In 2004, the Food and Drug Administration (FDA) along with the Environmental Protection Agency (EPA) jointly issued a health advisory offering guidance on the consumption of seafood due to mercury.

62 How would you rate your awareness of this advisory?

- ☐ Not aware
- ☐ Aware but not knowledgeable
- ☐ Aware and knowledgeable
- ☐ Aware and very knowledgeable

SUBMIT

Survey Page 38

## Seafood Survey

Here is a link to the health advisory. Please read the advisory before answering the next questions.

[FDA and EPA Public Health Advisory](#)

SUBMIT



### Seafood Survey

63 To whom does this advisory apply? (Check all that apply)

- ☐ Women of child bearing age
- ☐ Pregnant or nursing women
- ☐ Everyone
- ☐ Teenagers
- ☐ Men
- ☐ Elderly people
- ☐ Young children
- ☐ All women
- ☐ Not sure

64 What is the amount of seafood this advisory recommends for you to eat?

- ☐ Unlimited seafood
- ☐ 2 meals per week (up to 12 ounces)
- ☐ 1 meal per week
- ☐ No seafood

SUBMIT

### Seafood Survey

65 Will this advisory cause you to change your seafood consumption habits?

- ☐ Yes
- ☐ No

SUBMIT

### Seafood Survey

66 How will this advisory cause you to change your seafood eating habits?  
(Check all that apply)

- ☐ The number of seafood meals you eat per week
- ☐ The size of the seafood meal you eat
- ☐ Type of seafood you eat
- ☐ Stop eating seafood

A blue button with a white arrow pointing right and the word "SUBMIT" in white capital letters.

### Seafood Survey

67 Would this change be an increase or a decrease in the total amount of seafood you eat?

- ☐ Increase
- ☐ Decrease
- ☐ No change

A blue button with a white arrow pointing right and the word "SUBMIT" in white capital letters.

### Seafood Survey

68 You said you would decrease the amount of seafood you eat because of the advisory; approximately how many fewer seafood meals per month would you eat?

- ☐ 0-1
- ☐ 2-3
- ☐ 4-5
- ☐ More than 5
- ☐ Not sure

SUBMIT

Survey Page 44

### Seafood Survey

- 69 You said you would increase the amount of seafood you eat because of the advisory; approximately how many more seafood meals per month would you eat?

- ☐ 0-1
- ☐ 2-3
- ☐ 4-5
- ☐ More than 5
- ☐ Not sure

SUBMIT

Survey Page 45

### Seafood Survey

- 70 How will this advisory change your consumption of the following types of seafood?

	1 Start or Increase	2 No Change	3 Stop or Decrease	4 Never Ate
Clams	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Crab	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Shark	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Canned Tuna	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Shrimp	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
King Mackerel	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Scallops				

	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Swordfish	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Cod	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Tilefish	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Flounder	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Squid (Calamari)	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Salmon	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Catfish	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Fresh Tuna	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4



Survey Page 46

## Seafood Survey

- 71 After reading this advisory, are you concerned about the level of mercury in the seafood you eat?

☐ YES ☐ NO

- 72 Do you feel this advisory encourages or discourages **you personally** to eat seafood?

- ☐ Encourages  
☐ Discourages  
☐ No effect



Survey Page 47

## Seafood Survey

- 73 If the FDA and EPA issued a health advisory stating there was **no risk** in consuming mercury through seafood, would you change the amount you eat of any of the following types of seafood?

	1 Start or Increase	2 No Change	3 Stop or Decrease	4 Never Ate
Clams	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Crab	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Shark	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Canned Tuna	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Shrimp	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
King Mackerel	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Scallops	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Swordfish	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Cod	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Tilefish	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Flounder	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Squid (Calamari)	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Salmon	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Catfish	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>
Fresh Tuna	<input type="button" value="1"/>	<input type="button" value="2"/>	<input type="button" value="3"/>	<input type="button" value="4"/>



### Seafood Survey

74 To whom does this FDA and EPA advisory apply? (Check all that apply)

- ☐ Women of child bearing age
- ☐ Pregnant or nursing women
- ☐ Everyone
- ☐ Teenagers
- ☐ Men
- ☐ Elderly people
- ☐ Young children
- ☐ All women
- ☐ Not sure

75 What is the amount of seafood this advisory recommends for you to eat?

- ☐ Unlimited seafood
- ☐ 2 meals per week (up to 12 ounces)
- ☐ 1 meal per week
- ☐ No seafood

A blue button with a white arrow pointing right and the word "SUBMIT" in white capital letters.

### Seafood Survey

76 Has this advisory caused you to change your seafood consumption habits?

☐ YES ☐ NO

A blue button with a white arrow pointing right and the word "SUBMIT" in white capital letters.

### Seafood Survey

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77 How has the advisory caused you to change your seafood eating habits? (Check all that apply)

- ☐ Number of seafood meals you eat weekly
- ☐ Size of the seafood meal you eat
- ☐ Type of seafood you eat
- ☐ Stopped eating seafood

 SUBMIT

Survey Page 51

### Seafood Survey

---

78 Has this change resulted in an increase or decrease in the total amount of seafood you eat?

- ☐ Increase
- ☐ Decrease
- ☐ No change

 SUBMIT

Survey Page 52

### Seafood Survey

---

79 You said you decreased the amount of seafood you eat because of the advisory; approximately how many fewer seafood meals per month are you eating?

- ☐ 0-1
- ☐ 2-3
- ☐ 4-5
- ☐ More than 5
- ☐ Not sure

SUBMIT

Survey Page 53

### Seafood Survey

80 You said you increased the amount of seafood you eat because of the advisory; approximately how many more seafood meals per month are you eating?

- ☐ 0-1
- ☐ 2-3
- ☐ 4-5
- ☐ More than 5
- ☐ Not sure

SUBMIT

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### Seafood Survey

81 How has this advisory impacted your consumption of the following types of seafood?

	1 Start or Increase	2 No Change	3 Stop or Decrease	4 Never Ate
Clams	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Crab	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Shark	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Canned Tuna	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Shrimp	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
King Mackerel	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4
Scallops				



	1	2	3	4
Swordfish	1	2	3	4
Cod	1	2	3	4
Tilefish	1	2	3	4
Flounder	1	2	3	4
Squid (Calamari)	1	2	3	4
Salmon	1	2	3	4
Catfish	1	2	3	4
Fresh Tuna	1	2	3	4



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## Seafood Survey

- 82 Does this advisory cause you to be concerned about the levels of mercury in the seafood you eat?

YES NO

- 83 Do you feel this advisory encourages or discourages **you personally** to eat seafood?

- ☐ Encourages
- ☐ Discourages
- ☐ No effect



Survey Page 56

## Seafood Survey

- 84 If the FDA and EPA issued a health advisory stating there was **no risk** in consuming mercury through seafood, would you change the amount you eat of any of the following types of seafood? (Check all that apply)

	1 Start or Increase	2 No Change	3 Stop or Decrease	4 Never Ate
Clams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Canned Tuna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shrimp	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King Mackerel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scallops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swordfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cod	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tilefish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flounder	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Squid (Calamari)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salmon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Catfish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fresh Tuna	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SUBMIT

### Seafood Survey

85 Which do you feel is a more healthy choice for pregnant women or developing children?

- ☐ Eating no seafood
- ☐ Eating 2 seafood meals per week
- ☐ Eating more than 2 seafood meals per week

SUBMIT

### Seafood Survey

86 In general, do you believe there is a high amount of mercury in seafood?

YES NO

87 Do you believe that there is a difference in the amount of mercury in various types of seafood?

- ☐ Yes
- ☐ No
- ☐ Not sure

SUBMIT

### Seafood Survey

88 Indicate whether you believe the following types of seafood contain a high or low amount of mercury:

1	2	3
Low	Not sure	High

Clams	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crab	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shark	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Canned Tuna	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shrimp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
King Mackerel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scallops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Swordfish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cod	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tilefish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Flounder	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Squid (Calamari)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salmon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Catfish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fresh Tuna	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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## Seafood Survey

- 89 If you walked into the market and both farmed and wild-caught fish were available, which would you buy? (Check all that apply)

- ☐ Farmed
- ☐ Wild-caught
- ☐ Neither
- ☐ No preference
- ☐ Depends on species
- ☐ Depends on price

---

90 Have you seen any organic labels on seafood?

- ☐ Yes
- ☐ No
- ☐ Not sure

---

91 If seafood had an "organic certification" for seafood label, which met USDA national organic standards, would this encourage you to buy it?

---

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### Seafood Survey

---

92 Would you be willing to pay more for seafood that had this organic labeling?

---

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### Seafood Survey

---

93 Have you heard that there are high levels of contaminants in farmed salmon?

SUBMIT

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### Seafood Survey

94 Has this information caused you to eat less farmed salmon?

- ☐ Yes
- ☐ No
- ☐ Not sure

SUBMIT

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### Seafood Survey

95 Do you believe that chemical contaminants are a greater concern in recreationally caught fish as compared to seafood that you purchase at a store or eat in a restaurant?

- ☐ Yes
- ☐ No
- ☐ Not sure

96 Are you aware that local or state health departments issue consumption advisories to help you decide which recreationally caught fish you should eat?

- ☐ Yes
- ☐ No
- ☐ Not sure

SUBMIT

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## Seafood Survey

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97 How do you currently get your information about seafood? (Please check all that apply)

- ☐ Physicians
- ☐ Nutritionists/Dieticians
- ☐ Media (TV, radio, magazines, newspapers, etc.)
- ☐ Point of purchase information
- ☐ Workshops or seminars
- ☐ Internet
- ☐ In-store signs or demonstrations
- ☐ Family/Friends
- ☐ Government publications
- ☐ University/Extension
- ☐ Brochures/Handouts
- ☐ Fish clerk
- ☐ Bait and tackle shop
- ☐ Community center
- ☐ Consumer advocacy groups
- ☐ Environmental groups
- ☐ Books (i.e., health or cook books)
- ☐ Health newsletter
- ☐ Other, please specify

98 If you had to choose just one from the above list, which do you feel is the best way for you to receive your information?



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## Seafood Survey

99 How would you rate your knowledge of the following seafood topics?

1 Not Knowledgeable	2 Somewhat Knowledgeable	3 Knowledgeable	4 Very Knowledgeable
Seafood contaminants			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safe seafood handling practices			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health benefits of eating seafood			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fish consumption advisories			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Where seafood comes from			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organic or Eco-labeled seafood products			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood quality			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood preparation			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood selection at a market			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farm-raised seafood			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood storage			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wild-caught seafood			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SUBMIT

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## Seafood Survey

100 How important are the following factors in making your seafood purchasing decisions?

1 Not Important	2 Somewhat Important	3 Important	4 Very Important
Seafood contaminants			
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Safe seafood handling practices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health benefits of eating seafood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fish consumption advisories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Where seafood comes from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organic or Eco-labeled seafood products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood preparation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood selection at a market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farm-raised seafood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood storage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wild-caught seafood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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## Seafood Survey

101 Below is a list of statements, please indicate your level of agreement with each one. (1 = Strongly Disagree and 5 = Strongly Agree)

1	2	3	4	5
Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I feel comfortable buying and preparing seafood at home.				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seafood is too expensive				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe overfishing is a problem				
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The government ensures that the seafood I buy is safe to eat.

1 2 3 4 5

I think seafood is good for your health.

1 2 3 4 5

I think that pregnant women should eat seafood.

1 2 3 4 5

It is easy to judge the freshness of seafood.

1 2 3 4 5

Seafood imported to the US is as safe as locally harvested products.

1 2 3 4 5

I trust the media to present the facts about seafood.

1 2 3 4 5

I think consumer groups provide accurate information about seafood.

1 2 3 4 5

People should follow government advice about which seafood to eat.

1 2 3 4 5

There is no need to be concerned about which seafood to eat.

1 2 3 4 5

I trust store personnel to be knowledgeable about the seafood I buy.

1 2 3 4 5

SUBMIT

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## Seafood Survey

102 Please indicate whether you disagree or agree with each of the following statements.

1 2 3  
Disagree Not Sure Agree

Deep-fat frying is a healthy way to prepare seafood.

1 2 3

The price of a farm raised fish is lower then a wild caught fish of the same species.

1 2 3

Oily fish, like tuna and salmon, are a good source of omega-3 fatty acids.

1 2 3

Seafood is an excellent source of high quality protein.

1 2 3

---

Aquaculture and farm-raised seafood are the same.

1

2

3

---

Proper trimming of recreationally caught fish can reduce the level of potential contaminants.

1

2

3

---

Allergens and disease-causing bacteria are the biggest food safety issues associated with seafood.

1

2

3

---

Nutrition professionals recommend eating seafood twice a week.

1

2

3

---

Americans eat more seafood than beef or poultry.

1

2

3

---

Every state posts fish consumption advisories about locally caught fish.

1

2

3

SUBMIT

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---

## Seafood Survey

---

The next few questions are for classification purposes only. They will only be used to group your answers with others like yourself. All answers will be strictly confidential.

---

103 What is your gender?

☐ Male

☐ Female

SUBMIT

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---

## Seafood Survey

---

104 Are you currently pregnant or nursing?

YES

NO

## Seafood Survey

105 What is your age range?

- ☐ 18 - 24
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65 - 74
- ☐ 75 and older

106 What is the highest level of education you have completed?

- ☐ Less than High School
- ☐ High School or GED
- ☐ Associate/Technical Degree
- ☐ Some College
- ☐ College Degree
- ☐ Post Graduate Degree
- ☐ Prefer not to answer

107 How would you describe yourself?

- ☐ White/Caucasian
- ☐ Black/African American
- ☐ Spanish/Hispanic/Latino
- ☐ Asian
- ☐ Pacific Islander
- ☐ Native American
- ☐ Prefer not to answer
- ☐ Other, please specify

108 What is your combined annual household income (before taxes)?

- ☐ Less than \$29,999
- ☐ Between \$30,000 - \$49,999
- ☐ Between \$50,000 - \$69,999
- ☐ Between \$70,000 - \$89,999
- ☐ Between \$90,000 - \$110,000
- ☐ Greater than \$110,000
- ☐ Prefer not to answer



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### Seafood Survey

109 Where do you live?

110 What is your home zip code? Please enter at least the first five digits.

111 How long have you lived in this area?

- ☐ <1 year
- ☐ 1-5 years
- ☐ 5-10 years
- ☐ >10 years
- ☐ Prefer not to answer

112 Including yourself how many people currently live in your household?

113 Are there any children currently living in your household in any of the following age groups?

	1 Yes	2 No
<2 years old	<input type="text" value="1"/>	<input type="text" value="2"/>

2-5 years old

1

2

6-10 years old

1

2

11-14 years old

1

2

15-18 years old

1

2

114 Do you fish recreationally?

- ☐ Regularly
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

115 Are you the primary food shopper for your household?

- ☐ Yes
- ☐ No
- ☐ Shared

116 Do you make the decision where to dine out in your household?

- ☐ Yes
- ☐ No
- ☐ Shared

SUBMIT

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**Appendix C**  
**CROSS TABULATION TABLES**

**Table C.1 Self-reported knowledge for seafood topics**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>SEAFOOD CONTAMINANTS</b>				< 0.000
Not knowledgeable	21.3	68.6	10.1	(417)
Somewhat knowledgeable	5.1	72.0	23.0	(492)
Knowledgeable	9.2	60.0	30.8	(130)
Very knowledgeable	17.4	43.5	39.1	(23)
<b>SAFE SEAFOOD HANDLING PRACTICES</b>				< 0.000
Not knowledgeable	26.4	66.8	6.8	(292)
Somewhat knowledgeable	7.9	72.8	19.2	(390)
Knowledgeable	6.2	68.5	25.3	(273)
Very knowledgeable	4.7	57.9	37.4	(107)
<b>HEALTH BENEFITS OF EATING SEAFOOD</b>				< 0.000
Not knowledgeable	35.1	60.1	4.8	(168)
Somewhat knowledgeable	8.7	75.1	16.2	(458)
Knowledgeable	7.1	68.1	24.8	(351)
Very knowledgeable	7.1	51.8	41.2	(85)
<b>FISH CONSUMPTION ADVISORIES</b>				< 0.000
Not knowledgeable	20.4	67.8	11.8	(398)
Somewhat knowledgeable	7.0	71.8	21.1	(497)
Knowledgeable	7.7	63.4	28.9	(142)
Very knowledgeable	12.0	44.0	44.0	(25)
<b>WHERE SEAFOOD COMES FROM</b>				< 0.000
Not knowledgeable	24.8	69.9	5.3	(246)
Somewhat knowledgeable	9.2	67.9	22.9	(445)
Knowledgeable	7.4	72.1	20.6	(272)
Very knowledgeable	8.1	58.6	33.3	(99)
<b>ORGANIC OR ECO-LABELED SEAFOOD PRODUCTS</b>				< 0.000
Not knowledgeable	15.1	69.7	15.2	(722)
Somewhat knowledgeable	5.6	68.5	25.9	(251)
Knowledgeable	6.6	64.5	28.9	(76)
Very knowledgeable	15.4	30.8	53.8	(13)



**Table C.1 Continued**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>SEAFOOD QUALITY</b>				< 0.000
Not knowledgeable	27.9	66.8	5.3	(301)
Somewhat knowledgeable	6.0	73.6	20.4	(450)
Knowledgeable	5.9	65.2	28.9	(253)
Very knowledgeable	6.9	53.4	39.7	(58)
<b>SEAFOOD PREPARATION</b>				< 0.000
Not knowledgeable	32.9	61.8	5.3	(246)
Somewhat knowledgeable	8.6	73.6	17.8	(409)
Knowledgeable	3.6	71.2	25.2	(306)
Very knowledgeable	3.0	56.4	40.6	(101)
<b>SEAFOOD SELECTION AT A MARKET</b>				< 0.000
Not knowledgeable	30.9	64.8	4.4	(298)
Somewhat knowledgeable	6.4	72.7	20.9	(454)
Knowledgeable	2.4	68.8	28.8	(250)
Very knowledgeable	5.0	55.0	40.0	(60)
<b>FARM-RAISED SEAFOOD</b>				< 0.000
Not knowledgeable	20.1	68.8	11.0	(462)
Somewhat knowledgeable	6.4	70.8	22.8	(439)
Knowledgeable	3.8	66.2	30.0	(130)
Very knowledgeable	12.9	41.9	45.2	(31)
<b>SEAFOOD STORAGE</b>				< 0.000
Not knowledgeable	26.7	68.3	5.0	(303)
Somewhat knowledgeable	7.3	71.5	21.2	(386)
Knowledgeable	5.9	66.4	27.7	(271)
Very knowledgeable	4.9	63.7	31.4	(102)
<b>WILD-CAUGHT SEAFOOD</b>				< 0.000
Not knowledgeable	20.4	68.5	11.1	(451)
Somewhat knowledgeable	7.6	71.1	21.4	(384)
Knowledgeable	3.9	69.3	26.8	(179)
Very knowledgeable	4.2	45.8	50.0	(48)

**Table C.2 Factors in seafood purchasing decisions**

<b>N = 1061</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>SEAFOOD CONTAMINANTS</b>				< 0.000
Not important	37.6	54.1	8.3	(133)
Somewhat important	7.4	75.6	17.0	(270)
Important	6.3	70.9	22.8	(333)
Very important	12.0	66.2	21.8	(325)
<b>SAFE SEAFOOD HANDLING PRACTICES</b>				< 0.000
Not important	37.6	53.8	8.5	(117)
Somewhat important	11.9	75.2	12.8	(218)
Important	7.8	69.4	22.8	(359)
Very important	8.7	68.4	22.9	(367)
<b>HEALTH BENEFITS OF EATING SEAFOOD</b>				< 0.000
Not important	37.2	55.4	7.4	(121)
Somewhat important	9.6	78.9	11.5	(270)
Important	9.0	71.5	19.4	(376)
Very important	8.5	60.5	31.0	(294)
<b>FISH CONSUMPTION ADVISORIES</b>				< 0.000
Not important	27.2	64.1	8.7	(184)
Somewhat important	8.2	72.4	19.4	(366)
Important	7.2	70.5	22.3	(332)
Very important	14.5	61.5	24.0	(179)
<b>WHERE SEAFOOD COMES FROM</b>				< 0.000
Not important	29.1	62.2	8.7	(172)
Somewhat important	9.8	74.0	16.3	(369)
Important	6.7	69.8	23.5	(328)
Very important	11.5	61.5	27.1	(192)
<b>ORGANIC OR ECO-LABELED SEAFOOD PRODUCTS</b>				< 0.000
Not important	16.0	70.2	13.8	(419)
Somewhat important	8.7	72.9	18.4	(358)
Important	6.9	67.2	25.9	(189)
Very important	20.0	47.4	32.6	(95)

**Table C.2 Continued**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>SEAFOOD QUALITY</b>				< 0.000
Not important	49.5	42.9	7.7	(91)
Somewhat important	13.5	72.9	13.5	(170)
Important	8.2	73.2	18.6	(365)
Very important	7.4	68.3	24.4	(435)
<b>SEAFOOD PREPARATION</b>				< 0.000
Not important	41.4	50.0	8.6	(116)
Somewhat important	11.4	74.3	14.3	(237)
Important	7.3	70.9	21.9	(398)
Very important	8.4	68.1	23.5	(310)
<b>SEAFOOD SELECTION AT A MARKET</b>				< 0.000
Not important	38.2	57.6	4.2	(144)
Somewhat important	10.2	73.8	16.0	(294)
Important	6.9	69.8	23.4	(394)
Very important	7.9	66.4	25.8	(229)
<b>FARM-RAISED SEAFOOD</b>				< 0.000
Not important	18.7	69.4	11.9	(310)
Somewhat important	9.0	72.3	18.7	(390)
Important	7.0	66.7	26.3	(243)
Very important	16.9	57.6	25.4	(118)
<b>SEAFOOD STORAGE</b>				< 0.000
Not important	40.0	52.0	8.0	(125)
Somewhat important	10.2	75.5	14.3	(245)
Important	6.8	71.7	21.6	(385)
Very important	9.5	65.7	24.8	(306)
<b>WILD-CAUGHT SEAFOOD</b>				< 0.000
Not important	21.5	67.1	11.4	(289)
Somewhat important	8.4	75.5	16.1	(347)
Important	6.6	68.1	25.3	(273)
Very important	13.8	55.9	30.3	(152)

**Table C.3 Knowledge statements**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>DEEP FAT FRYING IS A HEALTHY WAY TO PREPARE SEAFOOD</b>				<0.000
Correct	9.6	70.5	19.9	(743)
Incorrect	18.5	63.9	17.6	(319)
<b>THE PRICE OF FARM RAISED FISH IS LOWER THAN A WILD CAUGHT FISH OF THE SAME SPECIES</b>				0.001
Correct	5.8	68.4	28.5	(190)
Incorrect	13.6	68.6	17.8	(872)
<b>OILY FISH, LIKE TUNA AND SALMON, ARE A GOOD SOURCE OF OMEGA-3 FATTY ACIDS</b>				<0.000
Correct	7.2	70.7	22.1	(706)
Incorrect	22.2	64.3	13.5	(356)
<b>SEAFOOD IS AN EXCELLENT SOURCE OF HIGH QUALITY PROTEIN</b>				<0.000
Correct	8.0	71.2	20.8	(784)
Incorrect	24.1	61.2	14.7	(278)
<b>AQUACULTURE AND FARM- RAISED SEAFOOD ARE THE SAME</b>				0.006
Correct	6.6	64.8	28.7	(122)
Incorrect	13.0	69.0	18.0	(940)
<b>PROPER TRIMMING OF RECREATIONALLY CAUGHT FISH CAN REDUCE THE LEVEL OF POTENTIAL CONTAMINANTS</b>				0.007
Correct	6.6	72.7	20.7	(256)
Incorrect	14.0	67.2	18.7	(806)

**Table C.3 Continued**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>ALLERGENS AND DISEASE- CAUSING BACTERIA ARE THE BIGGEST FOOD SAFETY ISSUES ASSOCIATED WITH SEAFOOD</b>				0.421
Correct	10.3	70.8	18.8	(319)
Incorrect	13.1	67.6	19.4	(743)
<b>NUTRITION PROFESSIONALS RECOMMEND EATING SEAFOOD TWICE A WEEK</b>				<0.000
Correct	8.5	70.4	21.1	(679)
Incorrect	18.8	65.3	15.9	(383)
<b>AMERICANS EAT MORE SEAFOOD THAN BEEF OR POULTRY</b>				0.197
Correct	10.7	69.5	19.8	(616)
Incorrect	14.3	67.3	18.4	(446)
<b>EVERY STATE POSTS FISH CONSUMPTION ADVISORIES ABOUT LOCALLY CAUGHT FISH</b>				0.002
Correct	5.3	70.9	23.8	(206)
Incorrect	13.9	68.0	18.1	(856)

**Table C.4 Attitude statements**

<b>N = 1061</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>I FEEL COMFORTABLE BUYING AND PREPARING SEAFOOD</b>				< 0.000
Strongly disagree	55.4	41.1	3.6	(56)
Disagree	33.3	57.1	9.5	(84)
Neither agree or disagree	18.3	69.1	12.6	(278)
Agree	3.2	75.0	21.8	(464)
Strongly agree	2.8	64.8	32.4	(179)
<b>SEAFOOD IS TOO EXPENSIVE</b>				< 0.000
Strongly disagree	20.0	50.0	30.0	(30)
Disagree	6.4	61.5	32.1	(156)
Neither agree or disagree	13.0	69.2	17.8	(400)
Agree	11.3	70.1	18.6	(345)
Strongly agree	17.7	74.6	7.7	(130)
<b>I BELIEVE OVERFISHING IS A PROBLEM</b>				0.001
Strongly disagree	26.0	58.0	16.0	(50)
Disagree	13.3	70.4	16.3	(98)
Neither agree or disagree	15.5	68.2	16.3	(399)
Agree	6.9	71.7	21.5	(321)
Strongly agree	10.4	65.8	23.8	(193)
<b>THE GOVERNMENT ENSURES THAT THE SEAFOOD I BUY IS SAFE TO EAT</b>				0.002
Strongly disagree	23.3	59.3	17.4	(86)
Disagree	11.9	70.8	17.4	(219)
Neither agree or disagree	11.9	68.6	19.5	(477)
Agree	6.8	71.1	22.1	(235)
Strongly agree	25.0	61.4	13.6	(44)
<b>I THINK SEAFOOD IS GOOD FOR YOUR HEALTH</b>				< 0.000
Strongly disagree	64.3	21.4	14.3	(14)
Disagree	45.0	45.0	10.0	(20)
Neither agree or disagree	27.2	60.7	12.1	(206)
Agree	7.6	75.6	16.9	(528)
Strongly agree	5.5	65.2	29.4	(293)

**Table C.4 Continued**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>I THINK THAT PREGNANT WOMEN SHOULD EAT SEAFOOD</b>				<b>&lt; 0.000</b>
Strongly disagree	23.4	62.3	14.4	(167)
Disagree	8.2	75.0	16.8	(232)
Neither agree or disagree	13.5	67.8	18.7	(438)
Agree	3.7	70.5	25.8	(190)
Strongly agree	17.6	52.9	29.4	(34)
<b>IT IS EASY TO JUDGE THE FRESHNESS OF SEAFOOD</b>				<b>&lt; 0.000</b>
Strongly disagree	28.9	61.4	9.6	(83)
Disagree	10.5	74.3	15.1	(304)
Neither agree or disagree	14.9	66.8	18.3	(382)
Agree	5.0	69.3	25.6	(238)
Strongly agree	9.3	55.6	35.2	(54)
<b>SEAFOOD IMPORTED TO THE U.S. IS AS SAFE AS LOCALLY HARVESTED PRODUCTS</b>				<b>&lt; 0.000</b>
Strongly disagree	30.1	53.0	16.9	(83)
Disagree	10.5	73.7	15.8	(228)
Neither agree or disagree	11.7	69.9	18.4	(581)
Agree	6.2	66.9	26.9	(145)
Strongly agree	16.7	50.0	33.3	(24)
<b>I TRUST THE MEDIA TO PRESENT THE FACTS ABOUT SEAFOOD</b>				<b>0.007</b>
Strongly disagree	27.5	55.0	17.5	(80)
Disagree	10.4	70.3	19.2	(182)
Neither agree or disagree	10.9	70.6	18.5	(439)
Agree	10.7	69.3	20.0	(300)
Strongly agree	15.0	61.7	23.3	(60)

**Table C.4 Continued**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>I THINK CONSUMER GROUPS PROVIDE ACCURATE INFORMATION ABOUT SEAFOOD</b>				<b>&lt; 0.000</b>
Strongly disagree	29.4	55.9	14.7	(34)
Disagree	21.6	61.3	17.1	(111)
Neither agree or disagree	12.2	69.8	18.0	(556)
Agree	6.3	70.6	23.1	(316)
Strongly agree	18.2	65.9	15.9	(44)
<b>PEOPLE SHOULD FOLLOW GOVERNMENT ADVICE ABOUT WHICH SEAFOOD TO EAT</b>				<b>0.001</b>
Strongly disagree	37.1	54.3	8.6	(35)
Disagree	11.9	68.7	19.4	(67)
Neither agree or disagree	12.6	67.3	20.1	(453)
Agree	9.1	71.6	19.4	(408)
Strongly agree	15.3	66.3	18.4	(98)
<b>THERE IS NO NEED TO BE CONCERNED ABOUT WHICH SEAFOOD TO EAT</b>				<b>&lt; 0.000</b>
Strongly disagree	17.6	62.7	19.6	(204)
Disagree	8.0	72.5	19.6	(414)
Neither agree or disagree	15.9	68.8	15.3	(321)
Agree	4.2	66.3	29.5	(95)
Strongly agree	22.2	55.6	22.2	(27)
<b>I TRUST STORE PERSONNEL TO BE KNOWLEDGEABLE ABOUT THE SEAFOOD I BUY</b>				<b>0.180</b>
Strongly disagree	21.5	59.5	19.0	(79)
Disagree	11.2	69.2	19.6	(214)
Neither agree or disagree	12.9	69.5	17.6	(397)
Agree	10.0	67.8	22.3	(301)
Strongly agree	11.4	74.3	14.3	(70)



**Table C.5 Most frequent seafood consumption location**

<b>n = 932</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>		
<b>MOST FREQUENT SEAFOOD CONSUMPTION LOCATION</b>			< 0.000
Prepared at home	70.6	29.4	(472)
In a restaurant	86.4	13.6	(391)
Fast food or take-out	82.6	17.4	(69)

**Table C.6 Current sources of seafood information**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>PHYSICIAN</b>				0.023
Yes	11.0	61.7	27.3	(154)
No	12.4	69.7	17.8	(908)
<b>NUTRITIONISTS/DIETITIANS</b>				< 0.000
Yes	7.3	61.2	31.5	(165)
No	13.2	69.9	16.9	(897)
<b>MEDIA</b>				< 0.000
Yes	8.8	71.9	19.3	(669)
No	18.1	62.8	19.1	(393)
<b>POINT OF PURCHASE</b>				< 0.000
Yes	2.5	70.1	27.4	(157)
No	13.9	68.3	17.8	(905)
<b>WORKSHOPS OR SEMINARS</b>				0.876
Yes	8.3	75.0	16.7	(12)
No	12.3	68.5	19.2	(1050)
<b>INTERNET</b>				0.002
Yes	9.2	66.8	24.0	(400)
No	14.0	69.6	16.3	(662)
<b>IN-STORE SIGNS OR DEMO</b>				0.003
Yes	5.2	67.4	27.4	(135)
No	13.3	68.7	18.0	(927)
<b>FAMILY/FRIENDS</b>				0.239
Yes	13.5	65.5	21.0	(415)
No	11.4	70.5	18.1	(647)
<b>GOVERNMENT PUBLICATIONS</b>				0.001
Yes	4.8	67.8	27.4	(146)
No	13.4	68.7	17.9	(916)
<b>UNIVERSITY/EXTENSION</b>				0.420
Yes	13.5	59.5	27.0	(37)
No	12.2	68.9	18.9	(1025)
<b>BROCHURES/HANDOUTS</b>				0.014
Yes	5.8	68.6	25.5	(137)
No	13.2	68.5	18.3	(925)

**Table C.6 Continued**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>FISH CLERK</b>				0.006
Yes	2.7	68.0	29.3	(75)
No	13.0	68.6	18.4	(987)
<b>BAIT AND TACKLE SHOP</b>				0.668
Yes	11.1	63.9	25.0	(36)
No	12.3	68.7	19.0	(1026)
<b>COMMUNITY CENTER</b>				0.275
Yes	7.1	57.1	35.7	(14)
No	12.3	68.7	19.0	(1048)
<b>CONSUMER ADVOCACY GROUPS</b>				0.019
Yes	3.5	70.6	25.9	(85)
No	13.0	68.4	18.6	(977)
<b>ENVIRONMENTAL GROUPS</b>				0.004
Yes	5.8	64.4	29.8	(104)
No	12.9	69.0	18.1	(958)
<b>BOOKS (E.G. HEALTH/COOK BOOKS)</b>				< 0.000
Yes	7.1	60.6	32.3	(155)
No	13.1	69.9	17.0	(907)
<b>HEALTH NEWSLETTER</b>				< 0.000
Yes	5.2	67.3	27.4	(248)
No	14.4	68.9	16.7	(814)

**Table C.7 Respondent status as primary shopper for the household**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>PRIMARY SHOPPER FOR THE HOUSEHOLD</b>				0.129
Yes	12.2	67.2	20.6	(647)
No	17.0	62.5	20.5	(112)
Shared	10.6	73.6	15.8	(303)

**Table C.8 Respondent status as decision maker for dining out location**

<b>N = 1062</b>	<b>NONE</b>	<b>CSE-NR</b>	<b>CSE-R</b>	<b>P value (n)</b>
	<b>Row %</b>			
<b>DECISION MAKER FOR LOCATION TO DINE OUT</b>				0.002
Yes	12.6	63.0	24.4	(438)
No	21.1	68.4	10.5	(38)
Shared	11.4	72.7	15.9	(586)