

Effectiveness of Educational and Psychological Messaging Interventions to Improve Safe Fish Consumption Knowledge and Behaviors Among Asian Women of Childbearing Age

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ABSTRACT

Background: We evaluated the effectiveness of an intervention to reduce contaminant exposure from fish consumption among Asian women of childbearing age residing in the Milwaukee, Wisconsin, area.

Methods: Women of childbearing age were randomized to group 1, no intervention; group 2, educational messaging only; or group 3, educational messaging plus a motivational self-affirmation component. Then, we compared safe fish consumption knowledge, intentions, and behaviors among groups.

Results: Among 123 participants, groups 2 and 3 were more likely than group 1 to report “eating fewer fish meals” to reduce exposure to contaminants (group 2 odds ratio [OR] 1.42; 95% CI, 0.59–3.44; group 3 OR 2.76; 95% CI, 1.12–7.03).

Discussion: Self-affirmation messaging can enhance educational messaging to increase safe fish consumption among Asian women of childbearing age.

BACKGROUND

Fish contain key nutrients and are recommended as part of a healthy diet to support fetal neurodevelopment during pregnancy.¹ However, fish consumption might result in fetal exposure to contaminants, including mercury, perfluoroalkyl and polyfluoroalkyl substances (PFAS), and polychlorinated biphenyls (PCBs).¹ The US Food and Drug Administration (FDA), Environmental Protection Agency (EPA),¹ and Wisconsin Department of Natural Resources (DNR)^{2,3} have issued advisories to practice safe fish preparation methods and avoid consum-

ing certain fish species. Several freshwater bodies near Milwaukee, Wisconsin, are designated as an Area of Concern because of contaminant levels and have additional consumption advisories.³

Asians individuals residing in the United States had higher reported fish consumption than other racial/ethnic groups⁴ and might be at higher risk for mercury, PFAS, or PCB contaminant exposure from fish.⁵ To better understand fish advisory awareness and consumption behaviors among Asian women of childbearing age (WCBA), we conducted a focus group and quantitative survey. Most focus group participants had not heard of specific advisories.⁶ Those

who expressed greater self-efficacy (ie, the belief that they could make desired changes to their behavior) were more willing to follow advisories.⁶ Among survey respondents, only 40.5% had heard of any fish consumption advisories.⁷ These findings demonstrated a need for interventions to increase Asian WCBA's awareness of fish advisories and willingness to follow them.

In this evaluation, we assessed whether educational messaging with or without a motivational self-affirmation component can increase perceived self-efficacy⁸ and lead to improved fish advisory awareness and safer fish consumption behaviors.

METHODS

Eligibility and Recruitment

We recruited participants through convenience and snowball sampling. Community advisory group members, schools, DNR listservs, and community organizations distributed recruitment materials to potentially eligible persons. We also asked participants who completed the survey to recruit additional participants within their social networks.

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Interested persons used a hyperlink on the recruitment materials to complete a REDCap (Research Electronic Data Capture) screening survey. Eligible participants must have met the following screening criteria: (1) resided ≥1 year in Milwaukee, Waukesha, Washington, or Ozaukee counties; (2) female; (3) self-identified as Chinese, Filipino, Hmong, or Karen; (4) aged 18 to 50 years; (5) had consumed ≥1 meal of fish caught by the participant or by someone the participant knows from waterbodies in Wisconsin in the last 12 months; (6) the only member of their household to participate in the telephone survey; and (7) had not participated in a previous project about fish consumption with the Wisconsin Department of Health Services. Participants completed survey instruments in their preferred language, which included English, Chinese, Hmong, or Karen.

Procedures

After screening, we randomized participants 1:1:1 to group 1 (no intervention), group 2 (educational messaging only), or group 3 (educational and motivational self-affirmation messaging). All participants completed a baseline REDCap survey. Within that survey, groups 2 and 3 completed the intervention components. After the interventions, all participants completed additional survey items in the same survey instrument. One month later, participants were sent a follow-up survey through REDCap. Each participant received \$30 and \$20 gift cards after completing the baseline survey and 1-month follow-up survey, respectively. This activity was reviewed by the Centers for Disease Control and Prevention (CDC), deemed not research, and conducted consistent with applicable federal law and CDC policy (45 CFR part 46.102(l)(2), 21 CFR part 56; 42 USC Sect 241(d); 5 USC Sect 552a; 44 USC Sect. 3501 et seq).

Intervention Components

Educational Messages: Groups 2 and 3 read health messages, including recommendations from the FDA, EPA, and Wisconsin DNR.^{1-3,9} Participants read through infographics showing healthy fish serving sizes for children and adults and fish preparation

methods to reduce chemical exposure. Graphics also showed fresh-caught and storebought fish species categorized as “up to 2 meals per week,” “up to 1 meal per week,” “up to 1 meal per month,” and “do not eat.” A final message included general advice for reducing contaminant exposure in fresh-caught fish (eg, “choose smaller, younger fish”) (Appendices 1 and 2).

Self-Affirmation Messages: Immediately before they saw the educational messages, group 3 completed a self-affirmation exercise.

Table 1. Demographic Characteristics and Baseline Fish Consumption and Preparation Behavior Among 123 Asian Women of Childbearing Age by Intervention Condition – Milwaukee, Wisconsin, June 7, 2023–February 24, 2023

	Overall (n=123)	Group 1 ^a (n=38)	Group 2 ^b (n=43)	Group 3 ^c (n=42)
Age, years; mean (SD)	32 (7.7)	31 (6.9)	33 (8.2)	33 (7.8)
Years living in the Milwaukee area, mean (SD)	3.5 (0.87)	3.5 (0.86)	3.5 (0.88)	3.5 (0.89)
Household size, mean (SD)	4.3 (2.0)	4.7 (2.3)	4.1 (1.7)	4.1 (2.0)
Number of children in household, mean (SD)	1.5 (1.6)	1.4 (1.7)	1.6 (1.6)	1.6 (1.4)
Ethnicity, n (%)				
Chinese	15 (12)	3 (8)	9 (21)	3 (7)
Filipino	14 (11)	5 (13)	5 (12)	4 (10)
Hmong	77 (63)	25 (66)	22 (51)	30 (71)
Karen	17 (14)	5 (13)	7 (16)	5 (12)
Survey language, n (%)				
English	111 (90)	37 (97)	34 (79)	40 (95)
Karen	6 (5)	1 (3)	5 (12)	0 (0)
Chinese	1 (1)	0 (0)	1 (2)	0 (0)
Hmoob or Hmong	5 (4)	0 (0)	3 (7)	2 (5)
Educational attainment, n (%)				
Some college or less	46 (39)	11 (31)	17 (40)	18 (44)
Associate degree or more	72 (61)	24 (69)	25 (60)	23 (56)
Fish consumption and behaviors				
Local wild-caught fish meal frequency in the last month, n (%)				
1 time in the last month	105 (85)	31 (82)	38 (88)	36 (86)
2 or 3 times in the last month	17 (14)	6 (16)	5 (12)	6 (14)
Storebought fish meal frequency in the last month, n (%)				
1 time in the last month	89 (72)	28 (74)	29 (67)	32 (76)
2 or 3 times in the last month	33 (27)	9 (24)	14 (33)	10 (24)
Have you ever: n (%)				
Eaten fewer fish meals	66 (54)	20 (53)	24 (56)	22 (52)
Eaten different types or species of fish	73 (59)	25 (66)	23 (53)	25 (60)
Avoided eating certain parts of fish (head, fat, belly, skin)	61 (50)	20 (53)	19 (44)	22 (52)
Avoided eating fish from some fishing locations	75 (61)	24 (63)	25 (58)	26 (62)
Consuming fish parts that contain more fat (sometimes or more frequently), n (%)				
Skin	96 (78)	28 (74)	33 (77)	35 (83)
Head	83 (67)	26 (68)	29 (67)	28 (67)
Guts, organs, or other innards	20 (16)	9 (24)	4 (9)	7 (17)
Belly fat	51 (41)	16 (42)	15 (35)	20 (48)
Fish preparation methods that can trap fat and increase contaminant exposure (sometimes or more frequently), n (%)				
Use fish or fish parts to make broth, stock, curry, or soup	58 (47)	20 (53)	17 (40)	21 (50)
Fish preparation methods that reduce contaminant exposure, n (%)				
Grill or roast	109 (89)	31 (82)	38 (88)	40 (95)

^aGroup 1: No intervention components (control group).

^bGroup 2: Educational interventions only.

^cGroup 3: Self-affirmation and educational interventions.

Table 2. Participant Fish Consumption Intentions, Consumption Behaviors, and Preparation Methods —Milwaukee, Wisconsin, June 7, 2023–February 24, 2023

Postintervention Intentions (Yes)	Group 1 ^a (n = 38)		Group 2 ^b (n = 43)		Group 3 ^c (n = 42)	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Eat 1 to 2 servings (but not more) of fish every week	N/Ad	N/Ad	33 (77)	Ref	33 (79)	1.11 (0.40–3.14)
Choose to eat types (species) of fish that are lower in chemicals, like mercury	N/Ad	N/Ad	39 (91)	Ref	39 (93)	1.33 (0.28–7.14)
Clean or cook fish using ways that may lower the amount of chemicals	N/Ad	N/Ad	40 (93)	Ref	39 (93)	0.98 (0.17–5.55)
Behaviors at 1-month follow-up	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Intention to follow educational messages (n: sometimes or more frequently)	N/Ad	N/Ad	33 (77)	Ref	32 (76)	0.97 (0.35–2.67)
Behavior changes in the past month (n: Yes)						
Eaten fewer fish meals	17 (45)	Ref	23 (53)	1.42 (0.59–3.44)	29 (69)	2.76 (1.12–7.03)
Eaten different types or species of fish	17 (45)	Ref	18 (42)	0.89 (0.47–2.15)	25 (60)	1.82 (0.75–4.47)
Avoided eating certain parts of fish (head, fat, belly, skin)	21 (55)	Ref	31 (72)	2.09 (0.84–5.37)	27 (64)	1.46 (0.59–3.61)
Avoided eating fish from some fishing locations	18 (47)	Ref	30 (70)	2.56 (1.04–6.51)	31 (74)	3.13 (1.25–8.22)
Specific fish consumption behaviors						
Consuming fish parts that contain more fat (n: sometimes or more frequently)						
Skin	27 (71)	Ref	26 (60)	0.69 (0.25–1.81)	22 (52)	0.54 (0.19–1.81)
Head	25 (66)	Ref	13 (30)	0.23 (0.09–0.59)	12 (29)	0.23 (0.08–0.60)
Guts, organs, or other innards	6 (16)	Ref	3 (7)	0.42 (0.08–1.73)	4 (10)	0.63 (0.15–2.40)
Belly fat	18 (47)	Ref	10 (23)	0.35 (0.13–0.91)	9 (21)	0.34 (0.12–0.89)
Fish preparation methods that might trap fat and increase contaminant exposure						
Use fish or fish parts to make broth, stock, curry, or soup (n: sometimes or more frequently)	22 (58)	Ref	11 (26)	0.26 (0.10–0.66)	12 (29)	0.32 (0.12–0.83)
Fish preparation method that might reduce contaminant exposure						
Grill or broil fish (n: sometimes or more frequently)	28 (74)	Ref	30 (70)	0.96 (0.34–2.74)	26 (62)	0.76 (0.27–2.13)

Abbreviation: OR, odds ratio.

^aGroup 1: No intervention components (control group).

^bGroup 2: Educational interventions only.

^cGroup 3: Self-affirmation and educational interventions.

^dGroup 1 was not asked items regarding postintervention intentions.

In self-affirmation interventions, participants are presented with reminders of their values to affirm a positive self-image. These reminders might increase perceived self-efficacy and willingness to adopt desired behaviors.¹⁰ To remind participants of their values, we asked each participant to respond to a series of items about their motivations. Each participant selected from a list of statements that “best represents what is most important to you when deciding how and what you eat.” Their selection prompted a nested list of new value statements related to their first choice. They selected a statement from this second list, then answered open-ended questions about why their chosen statement reflected their values (Appendices 1 and 2).

Survey Items

We collected demographic information and baseline fish consumption behaviors. A full list of survey items is available in Appendix 2. Immediately after the intervention, groups 2 and 3 reported whether they intended to make certain behavior changes (eg, “eat 1 to 2 servings [but not more] of fish every week”) in the next 30 days.

One month after the initial survey and intervention, we reassessed how frequently participants had consumed local, fresh-caught, and storebought fish. Using the same items as the baseline survey, participants were asked how frequently they consumed

certain fish parts and used different fish preparation methods. Participants reported whether they had made changes to their fish consumption habits in the past month. Groups 2 and 3 reported how frequently they intended to follow messages from the educational intervention.

Statistical Analysis

We calculated descriptive statistics of participant demographics, baseline fish consumption habits, and advisory awareness. We fit unadjusted logistic regression models to calculate odds ratios (OR) for differences among groups in postintervention intentions, reported behavior changes, fish consumption habits, and fish preparation methods at 1 month follow-up. For each model, the dependent variable was the 1-month survey item of interest, and the independent variable was the intervention group, with group 1 as the reference. For analysis, we focused on fish consumption habits and preparation methods mentioned in the educational materials as either increasing (ie, consuming the skin, head, guts, organs, innards, or belly fat or using fish to make broth, stock, curry, or soup) or decreasing (ie, grilling or broiling fish) contaminant exposure. To maximize sample size in each category, any item with a range of responses was dichotomized for analysis (eg, a 6-point scale from “1 time in the last month” to “2 or more times per day” was reduced to “<1 time

per week” vs “≥1 times per week”). We used R version 4.4.0 (R Core Team) for all analyses.

RESULTS

In total, 123 Asian women aged 20 to 50 years were survey participants. Thirty-eight participants were randomized to group 1, 43 to group 2, and 42 to group 3. Most participants were Hmong (n = 77, 63%), followed by Karen (n = 17, 14%), Chinese (n = 15, 12%), and Filipino (n = 14, 11%). Nearly all (n = 111, 90%) participants chose to complete the survey in English. Most participants had at least an associate degree (61%) (Table 1).

Most participants in the intervention groups reported intentions to follow educational messages. Immediately after the intervention, 77% of group 2 and 79% of group 3 reported they planned to “eat 1 to 2 servings (but not more) of fish every week.” Likewise, 91% to 93% said they planned to “choose to eat types (species) of fish that are lower in chemicals, like mercury” and “clean or cook fish using ways that may lower the amount of chemicals.” However, because group 1 did not answer these items, it is unclear whether the interventions improved participant intentions.

After 1 month, 77% of group 2 and 76% of group 3 reported they intended to follow the educational messages from the intervention (Table 2). Group 3 had higher odds than group 1 of reporting most behavior changes in the past 30 days, including “eating fewer fish meals” (OR 2.76; 95% CI, 1.12–7.03), “eating different types or species of fish” (OR 1.82; 95% CI, 0.75–4.47), and “avoided eating fish from some fishing locations” (OR 3.13; 95% CI, 1.25–8.22). Groups 2 and 3 reported eating the skin, head, guts, and belly fat of fish less often than group 1 (Table 2).

DISCUSSION

In this behavioral intervention of Asian WCBA in the Milwaukee area, we found motivational self-affirmation and educational messaging improved fish advisory awareness and safer fish consumption behaviors. Both groups 2 and 3 reported less frequent use of higher-contaminant fish preparation methods than group 1. These results are encouraging evidence that educational messaging might reduce these communities’ contaminant exposure from fish consumption. Group 3 was more likely than group 1 to report behavior changes to avoid contaminants from fish, indicating self-affirmation interventions are also beneficial. In keeping with our previous findings, intervention components designed to increase both fish advisory knowledge and self-efficacy increased safe fish consumption behaviors.

Maternal exposure to mercury, PFAS, and PCB contamination may lead to adverse birth outcomes and impact cognitive and reproductive health in infants.² Our team’s prior studies found that a sample of mostly White, mostly male Milwaukee-area anglers had elevated contaminant levels, and in Wisconsin,

Asian people have higher incidence of severe maternal morbidity and low birthweight than comparator groups.^{11,12} Although these poor outcomes are likely multifactorial, limiting contaminant exposure from eating fish in Asian WCBA in the Milwaukee area may improve maternal and child health and reduce these health disparities. Clinicians and public health practitioners can use these combined educational and self-affirmation materials to reduce contaminant exposure from fish consumption in this community.

Limitations

Our smaller-than-intended sample size (n = 201) limits inference. Second, surveys and intervention materials required internet access and fluency in written English, Hmong, Chinese, or Karen, which might have excluded some eligible persons. Third, responses were self-reported and subject to social desirability bias. Lastly, we followed participants for only 1 month, so durability of our findings is unknown.

CONCLUSIONS

This behavioral intervention was associated with increased safe fish consumption behaviors among Asian WCBA in the Milwaukee area. Self-affirmation paired with educational messaging might be a valuable tool to reduce contaminant exposure from fish in this population.

Funding/Support: None declared.

Financial Disclosures: None declared.

Acknowledgement: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Appendices: Available at www.wmjonline.org

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A

Learning about your values

We now want to learn more about the values that are important to you.

Please read the following statements and select the one that best represents what is most important to you when deciding how and what you eat. [Selected statement will branch to that category's list of statements]

- The quality of the food I feed my family matters to me.
- I eat food that keeps me healthy.
- I am connected to my family and friends by our shared enjoyment of eating meals together.
- Following food and nutrition guidelines is important for my health.
- I trust myself to make healthy food choices.

Please read the final list of statements and select the one that best represents what is most important to you when deciding how and what you eat. Your original choice plus four other statements are available for you to choose from. [Branch to only show the category chosen by the selected first statement]

Category 1 (for those who chose "The quality of the food I feed my family matters to me"):

- The quality of the food I feed my family matters to me.
- Choosing food that is nutritious for my children is important to me.
- It is important to me that my family is healthy.
- The food I feed my children helps keep them healthy.
- My family eats meals that have high nutritional value.

Category 2 (for those who chose "I eat food that keeps me healthy."):

- I eat food that keeps me healthy.
- I care about the quality and taste of the food I eat.
- Eating healthy food makes me feel strong.
- I eat healthy food to prevent getting sick.
- The food I eat is directly related to my health.

Category 3 (for those who chose "I am connected to my family and friends by our shared enjoyment of eating meals together."):

- I am connected to my family and friends by our shared enjoyment of eating meals together.
- Cooking meals at home with my family is important to me.
- Cooking is my creative outlet.
- I go fishing to spend time with family and friends.
- I am connected to my family and friends by our shared tradition of fishing.

Category 4 (for those who chose "Following food and nutrition guidelines is important for my health."):

- Following food and nutrition guidelines is important for my health.
- If I feel unsure of which food to feed my family, I know how to find the answer.
- Learning about the food I eat allows me to make healthy choices.
- I seek out new information about food and nutrition.
- I change my diet if I learn new information about how to eat healthy.

Category 5 (for those who chose "I trust myself to make healthy food choices."):

- I trust myself to make healthy food choices.
- I am capable of choosing healthy food to eat.
- Choosing healthy food gives me the power to control my health.
- I have control over the food my family and I eat.
- I am able to choose healthy food for my family and myself.

Your final chosen statement: [Branch to show final chosen statement]

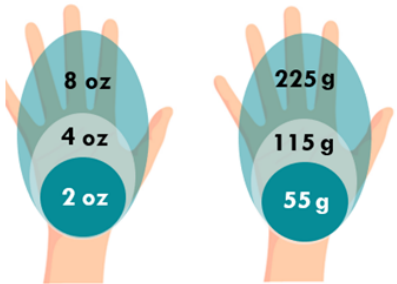
Now that you have selected your final statement, please share in the text box why this statement is important to you. [Include a text box]

B

The U.S. Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) recommend eating only 1 to 2 meals per week of fish that are known to be safer to eat. This allows you to still get the benefits of eating fish while avoiding harmful chemicals.

These images of an adult's palm show what different serving sizes of uncooked fish look like on the palm. The images are the same but presented in both ounces (oz) and grams (g).

What Does a Fish Meal Look Like?



Find out by using your hand!

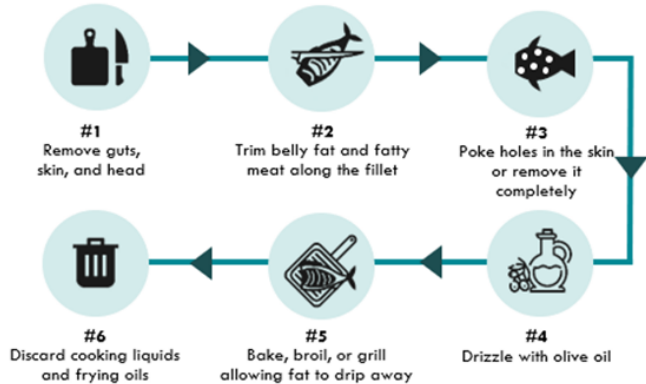
- Two adult fish meals:** size of an adult's hand (8 ounces/225 grams of uncooked fish)
- One adult fish meal:** size of an adult's palm (4 ounces/115 grams of uncooked fish)
- Child fish meal:** size of an adult's palm (2 to 4 ounces/55 to 115 grams of uncooked fish)

You can reduce some (not all) chemicals in fish when you prepare it. You can get rid of some chemicals by correctly trimming, skinning, and cooking fish to remove fat in the fish.

Bake, broil, or grill the fish on a rack, so the fat drips away. Don't use the drippings to make sauce or gravy.

Mercury is one chemical that you cannot reduce in fish by cooking or cleaning. To avoid mercury, eat smaller fish, choose types of fish known to have lower amounts of mercury, and do not eat fish from lakes with high amounts of mercury.

How Should I Clean and Cook My Fish?



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Baseline Survey (Groups 1-3)



Introduction

The Wisconsin Department of Health Services invites you to take a survey for women who eat fish caught from lakes, rivers, or streams in Wisconsin. The project is supported by the International Institute of Wisconsin.

Your participation in the survey is your choice, and all your information will be kept private. The survey will take 15 minutes to complete and will ask you things like where you live, your current eating practices with fish, and your future goals.

You will receive a \$30 gift card if you complete this survey. In one month, we will email you a link to complete a 10-minute follow-up survey. If you complete the follow-up survey, you will receive an additional \$20 gift card.

- Please answer questions 1 to 21 to complete the survey.
- Do not click “Submit” until you reach the end of question 21.

I. Do you agree to participate in the survey?

- Yes – [skip to ****2****]
- No – [skip to ****Not eligible****]

[Not eligible**]**

We appreciate your time and interest.

Based on your answer you do not qualify for this survey. Please exit the survey and let us know if you have any questions!

Thank you!

DHSFishStudy@dhs.wisconsin.gov

2. Provide your contact information so you can receive your gift card. Please make sure all information is correct before continuing to the next question. Gift cards can only be mailed to a valid Wisconsin mailing address in Milwaukee, Waukesha, Washington, or Ozaukee counties. **[Note: Pipe in answers from screening form]**

First name:
Last name:
Address (line 1):
Address (line 2):
City:
Zip code:
Email:
Best phone number:

Demographics

3. **Including** yourself, how many people currently live in your household?

- Total number: _____
- Prefer not to answer

4. How many children under the age of 15 live with you?

- Number under 15 years: _____
- Prefer not to answer

5. How long have you lived in the United States? If less than one year, please type "0."

- Number of years: _____
- Prefer not to answer

6. What is the highest level of school you have completed?

- 8th grade or less
- Some high school, no diploma or GED
- High school diploma or GED
- Some college, no diploma
- Associate degree
- Bachelor's degree
- Postgraduate, professional, or doctoral degree
- Prefer not to answer

Eating fish

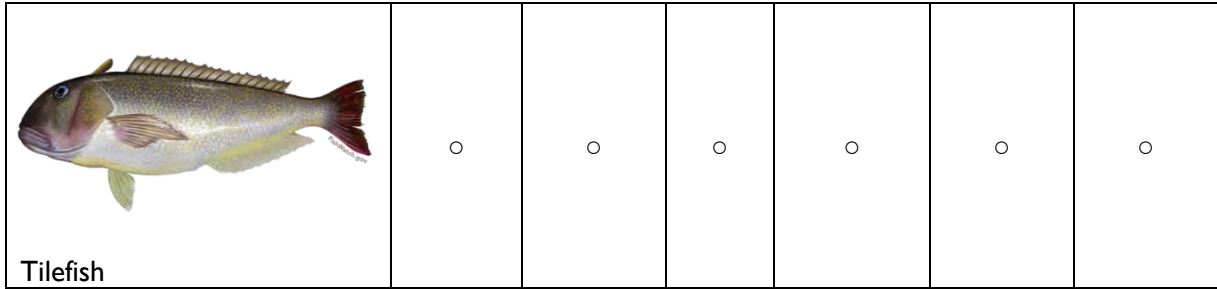
We will now ask you about the fish you ate that were bought from a store, fish vendor, or restaurant.

7a. Over the **last month**, did you eat fish that were bought from a store, fish vendor, or restaurant?

- Yes – **[skip to **7b**]**
- No – **[skip to **7c**]**

7b. Over the **last month**, how often did you eat fish that were bought from a store, fish vendor, or restaurant?

- 1 time in the last month
- 2 or 3 times in the last month
- 1 time per week
- 2 times per week
- 3 or 4 times per week
- 5 or 6 times per week
- 1 time per day
- 2 or more times per day



We will now ask you about the fish you ate that you or someone you know caught from lakes, rivers, or streams in Wisconsin.

8a. Over the **last month**, did you eat fish that you or someone you know caught from any lakes, rivers, or streams in Wisconsin?

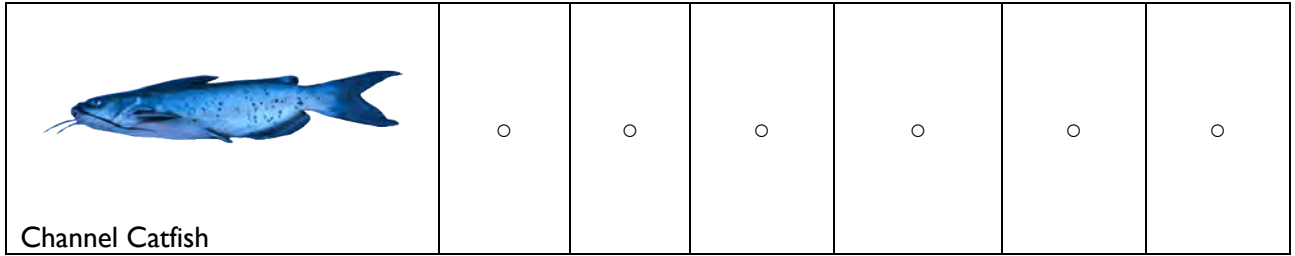
- Yes – [skip to ****8b****]
- No – [skip to ****8c****]

8b. Over the **last month**, how often did you eat fish that you or someone you know caught from lakes, rivers, or streams in Wisconsin?

- 1 time in the last month
- 2 or 3 times in the last month
- 1 time per week
- 2 times per week
- 3 or 4 times per week
- 5 or 6 times per week
- 1 time per day
- 2 or more times per day

8c. We will now ask you about 5 types of fish that could have been caught over the **last year**.

Over the **last year**, how often did you eat each of the following fish that you or someone you know caught from lakes, rivers, or streams in Wisconsin?



Advisory awareness

The following questions are about health advisories written to protect you from harmful chemicals in fish. These advisories are recommendations from the government about which fish are safe to eat.

9. Have you ever heard about, read, or seen the health advisories for fish caught in lakes, rivers, or streams in Wisconsin?

- Yes
- No
- Unsure

10. Have you ever heard about, read, or seen the health advisories on eating fish bought from stores, fish vendors, or restaurants?

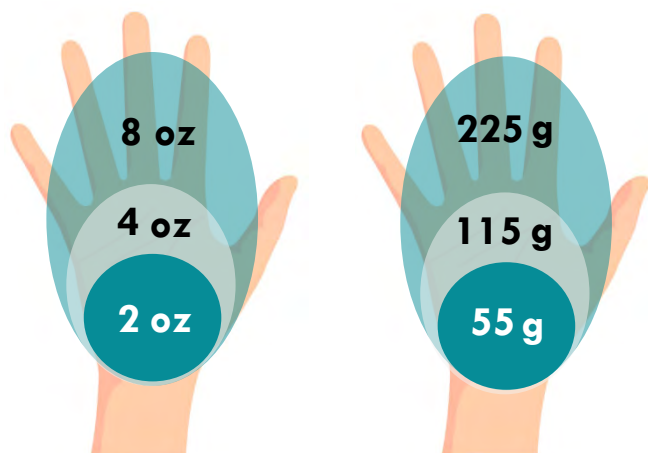
- Yes
- No
- Unsure

Eating behaviors

11. Have you ever made any of the following changes to your eating habits to avoid chemicals, such as mercury?

	Yes	No
Eaten fewer fish meals	○	○
Eaten different types or species of fish	○	○
Avoided eating certain parts of fish (head, fat, belly, skin)	○	○
Avoided eating fish from some fishing locations	○	○

12. Please look at the images of an adult's palm, which show what different serving sizes of uncooked fish look like on the palm. The images are the same but presented in both ounces (oz) and grams (g).



Based on the images, what is the typical serving size of fish you eat in one meal?

- More than 8 ounces / More than 225 grams
- 8 ounces / 225 grams
- 4 ounces / 115 grams
- 2 ounces / 55 grams
- Less than 2 ounces / Less than 55 grams

13. How often do you or the person who prepares your fish use:

	Never	Rarely	Sometimes	Very often	Always
The skin of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The head of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The guts, organs, or other innards of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The belly fat of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. How often do you or the person who cooks your fish use the following cooking methods:

	Never	Rarely	Sometimes	Very often	Always
Smoke or dry fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pickle fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use fish to make fish paste	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pan fry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grill, or roast fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deep fry fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boil or poach fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Braise fish (lightly fry and then simmer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use fish or fish parts to make broth/stock, curry, or soup	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Self-Affirmation Intervention Component (Group 3)

Learning about your values

We now want to learn more about the values that are important to you.

15. Please read the following statements and select the one that **best represents** what is most important to you when **deciding how and what you eat**. **[Selected statement will branch to that category's list of statements]**

- The quality of the food I feed my family matters to me.
- I eat food that keeps me healthy.
- I am connected to my family and friends by our shared enjoyment of eating meals together.
- Following food and nutrition guidelines is important for my health.
- I trust myself to make healthy food choices.

Please read the final list of statements and select the one that **best represents** what is most important to you when **deciding how and what you eat**. Your original choice plus four other statements are available for you to choose from. **[Branch to only show the category chosen by the selected first statement]**

Category 1:

- The quality of the food I feed my family matters to me.
- Choosing food that is nutritious for my children is important to me.
- It is important to me that my family is healthy.
- The food I feed my children helps keep them healthy.
- My family eats meals that have high nutritional value.

Category 2:

- I eat food that keeps me healthy.
- I care about the quality and taste of the food I eat.
- Eating healthy food makes me feel strong.
- I eat healthy food to prevent getting sick.
- The food I eat is directly related to my health.

Category 3:

- I am connected to my family and friends by our shared enjoyment of eating meals together.
- Cooking meals at home with my family is important to me.
- Cooking is my creative outlet.
- I go fishing to spend time with family and friends.
- I am connected to my family and friends by our shared tradition of fishing.

Category 4:

- Following food and nutrition guidelines is important for my health.
- If I feel unsure of which food to feed my family, I know how to find the answer.
- Learning about the food I eat allows me to make healthy choices.
- I seek out new information about food and nutrition.
- I change my diet if I learn new information about how to eat healthy.

Category 5:

- I trust myself to make healthy food choices.
- I am capable of choosing healthy food to eat.
- Choosing healthy food gives me the power to control my health.
- I have control over the food my family and I eat.
- I am able to choose healthy food for my family and myself.

Your final chosen statement: **[Branch to show final chosen statement]**

Now that you have selected your final statement, please share in the text box why this statement is important to you. **[Include a text box]**

Educational Intervention Component (Groups 2 and 3)

Health messages

Please read the following messages to learn more about how you can safely eat fish.

Eating fish is part of a healthy, well-balanced diet. Fish are a great source of protein and other nutrients, especially for women and babies since eating fish during pregnancy has been shown to help with a baby's brain development.

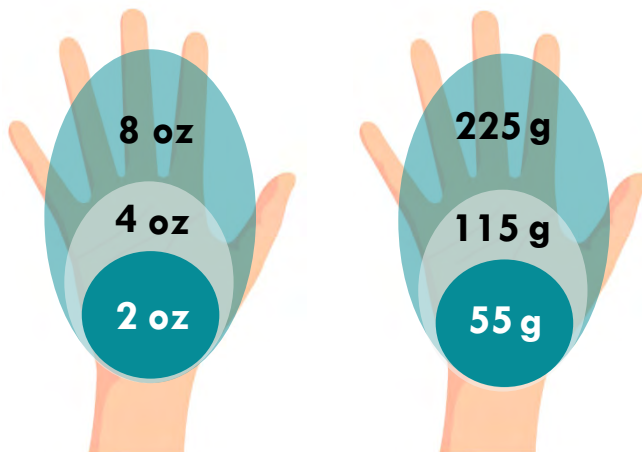
Though fish have many health benefits, some contain chemicals, like mercury, that can harm your health. Women who are pregnant or breastfeeding should include fish that are low in mercury in their diets.

- Click for the first health message

16a. The U.S. Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA) **recommend eating only 1 to 2 meals per week of fish that are known to be safer to eat.** This allows you to still get the benefits of eating fish while avoiding harmful chemicals.

These images of an adult's palm show what different serving sizes of uncooked fish look like on the palm. The images are the same but presented in both ounces (oz) and grams (g).

What Does a Fish Meal Look Like?



Find out by using your hand!

Two adult fish meals: size of an adult's hand
(8 ounces/225 grams of uncooked fish)
























One adult fish meal: size of an adult's palm
(4 ounces/115 grams of uncooked fish)

Child fish meal: size of an adult's palm
(2 to 4 ounces/55 to 115 grams of uncooked fish)

- Click for the next health message

I6b. This picture shows the number of meals of fish you can eat for certain types of fish. Safer fish can be eaten up to two meals per week. Some fish should only be eaten once a month or never eaten. Eating a variety of fish is better for you than eating the same type of fish every time.

Which Fish Should I Eat?

Up to 2 Meals Per Week	Up to 1 Meal Per Week	Up to 1 Meal Per Month	Do Not Eat
<ul style="list-style-type: none"> ■ Atlantic or Pacific Salmon (not Great Lakes)  ■ Farm-raised Catfish  ■ Pollock  ■ Shrimp  ■ Other purchased fish low in mercury 	<ul style="list-style-type: none"> ■ Bluegill  ■ Bullheads  ■ Canned Light Tuna  ■ Crappies  ■ Inland Trout  ■ Sunfish  ■ Yellow Perch  	<ul style="list-style-type: none"> ■ Bass  ■ Canned White (Albacore) Tuna  ■ Catfish  ■ Halibut  ■ Pike  ■ Tuna Steaks  ■ Walleye  ■ All other species 	<ul style="list-style-type: none"> ■ Muskies  ■ King Mackerel  ■ Shark  ■ Swordfish  ■ Tilefish  <p>! These fish all have very high levels of mercury</p>

- Click to see each individual section of the table [**Branch to show picture of “Up to 2 meals per week” section**]
- Click for the next section [**Branch to show picture of “Up to 1 meal per week” section**]
- Click for the next section [**Branch to show picture of “Up to 1 meal per month” section**]
- Click for the next section [**Branch to show picture of “Do Not Eat” section**]
- Click for the next health message [**skip to **I6c****]

I6c. You can reduce some (not all) chemicals in fish when you prepare it. You can get rid of some chemicals by correctly trimming, skinning, and cooking fish to remove fat in the fish.

Bake, broil, or grill the fish on a rack, so the fat drips away. Don't use the drippings to make sauce or gravy.

Mercury is one chemical that you cannot reduce in fish by cooking or cleaning. To avoid mercury, eat smaller fish, choose types of fish known to have lower amounts of mercury, and do not eat fish from lakes with high amounts of mercury.


How Should I Clean and Cook My Fish?



- Click for the final health message


I6d. Keep you and your family healthy by making safe choices when choosing which fish to eat.

Before You Fish, Keep in Mind:



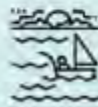
Size

Choose smaller, younger fish. Larger, older fish are more likely to have higher levels of chemicals.



Species

Eat a variety of fish. Fish that eat other fish tend to build up more chemicals.



Source

Know where your fish come from. Fish from some lakes and rivers have more chemicals than others.


➔

➔


By **choosing the right fish** and **cleaning** and **cooking** it the right way, you can reduce some of the chemicals in the fish **by nearly half!**

What do you know about eating fish?

17. For each statement below, please answer to the best of your knowledge.

	True	False
Women who are pregnant or breastfeeding should include fish that are low in mercury in their diets.	<input type="radio"/>	<input type="radio"/>
Older and larger fish have more chemicals than younger, smaller fish.	<input type="radio"/>	<input type="radio"/>
Mercury in fish can be reduced by using cleaning techniques.	<input type="radio"/>	<input type="radio"/>

Goals

18. In the next 30 days, do you plan to do any of the following?

	Yes	No
Eat 1 to 2 servings (but not more) of fish every week	<input type="radio"/>	<input type="radio"/>
Choose to eat types (species) of fish that are	<input type="radio"/>	<input type="radio"/>

lower in chemicals, like mercury		
Clean or cook fish using ways that may lower the amount of chemicals	○	○

Baseline Survey (Continued, Groups 1-3)**Educational information**

19. What information on how to safely eat fish would you find helpful? **Please check all that apply.**

- Types of fish that are safe to eat
- How to safely prepare and cook fish
- Information on where to catch fish that are safe to eat
- Other: _____

20. How would you prefer to receive educational information? **Please check all that apply.**

- Interactive games, like trivia questions or flashcards
- Printed materials, like brochures or flyers
- Radio / Podcast
- Videos
- Visual graphics
- Other: _____

21. If you have a question about something, where do you usually go for information? **Please check all that apply.**

- Books (Paper, Electronic, and/or Audio)
- Church
- Conferences / Seminars / Symposiums / Workshops
- Documentaries / Films
- Internet
- Journals (Paper or Electronic)
- Library
- Newspaper / Magazines (Paper or Electronic)
- Radio
- Relatives, friends, associates, co-workers
- School, classroom, instructors
- Social media
- Websites
- Other: _____

You have reached the end of the survey. Please click “Submit.”

Completion message [Displayed on screen after first survey is submitted]

Thank you for completing our first survey!

We will review your answers.

Please check your email for a message from us on next steps.

If you have any questions or concerns, please email us at DHSFishStudy@dhs.wisconsin.gov.

Sincerely,

Wisconsin Department of Health Services' Fish Program

Completion email [Automatically emailed to participant after first survey is submitted along with their survey answers]

From: Wisconsin Department of Health Services; DHSFishStudy@dhs.wisconsin.gov

Subject: Thank you for completing Fish Survey #1

[firstname_screen],

Thank you for taking the time to complete our first survey! We will use this information to help create materials for your community on how to safely eat fish.

Next steps:

1. We will mail you a **\$30 Walmart gift card** to the address you provided.
2. In **one month**, we will email you a link to complete a short follow-up survey. You will receive **an additional \$20 gift card** for completing this survey.
3. Share our screening form with friends who may qualify for the surveys and **earn a \$10 gift card for each person who participates!**

Link to screening form: <https://redcap.link/fish>

Who can participate?

Females, 18–50 years old, who:

- Identify as Chinese, Filipino, Hmong, or Karen (ethnic group from Myanmar).
- Live in Milwaukee, Waukesha, Washington, or Ozaukee County.
- Ate at least one meal Sixof fish caught from a Wisconsin waterbody in the last 12 months.
- Did not participate in our 2022 phone survey on eating fish.

Thank you again for participating!

Wisconsin Department of Health Services' Fish Program

Email: DHSFISHSTUDY@dhs.wisconsin.gov

One-month Follow-up Survey (Groups 1-3)



Introduction

The Wisconsin Department of Health Services invites you to take the final survey for women who eat fish caught from lakes, rivers, or streams in Wisconsin. The project is supported by the International Institute of Wisconsin

Your participation in the survey is your choice, and all your information will be kept private. The survey will take 10 minutes to complete and will ask you things like your current eating practices with fish and your future goals.

You will receive a \$20 gift card if you complete this survey.

- Please answer questions 1 to [9 or 11] to complete the survey.
- Do not click “Submit” until you reach the end of question [9 or 11].

I. Do you agree to participate in the survey?

- Yes – [skip to ****2****]
- No – [skip to ****Not eligible****]

[Not eligible**]**

We appreciate your time and interest.

Based on your answer you do not qualify for this survey. Please exit the survey and let us know if you have any questions!

Thank you!

DHSFishStudy@dhs.wisconsin.gov

2. Provide your contact information so you can receive your gift card. Please make sure all information is correct before continuing to the next question. Gift cards can only be mailed to a valid Wisconsin mailing address in Milwaukee, Waukesha, Washington, or Ozaukee counties. **[Note: Pipe in answers from survey #1]**

First name:
Last name:
Address (line 1):
Address (line 2):
City:
Zip code:
Email:
Best phone number:

Eating fish

We will now ask you about the fish you ate that were bought from a store, fish vendor, or restaurant.






3a. Over the **last month**, did you eat fish that were bought from a store, fish vendor, or restaurant?

- Yes – **[skip to **3b**]**
- No – **[skip to **4a**]**

3b. Over the **last month**, how often did you eat fish that were bought from a store, fish vendor, or restaurant?

- 1 time in the last month
- 2 or 3 times in the last month
- 1 time per week
- 2 times per week
- 3 or 4 times per week
- 5 or 6 times per week
- 1 time per day
- 2 or more times per day

3c. Over the **last month**, how often did you eat each of the following fish that were bought from a store, fish vendor, or restaurant?

	Did not eat	1 time in last month	2 to 3 times in last month	1 time per week	2 or more times per week
 Canned "White" Tuna (Albacore)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Fresh/Frozen Tuna	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Halibut	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Swordfish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Tilefish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

We will now ask you about the fish you ate that you or someone you know caught from lakes, rivers, or streams in Wisconsin.






4a. Over the **last month**, did you eat fish that you or someone you know caught from any lakes, rivers, or streams in Wisconsin?

- Yes – [skip to ****4b****]
- No – [skip to ****5****]

4b. Over the **last month**, how often did you eat fish that you or someone you know caught from lakes, rivers, or streams in Wisconsin?

- 1 time in the last month
- 2 or 3 times in the last month
- 1 time per week
- 2 times per week
- 3 or 4 times per week
- 5 or 6 times per week
- 1 time per day
- 2 or more times per day

4c. Over the **last month**, how often did you eat each of the following fish that you or someone you know caught from lakes, rivers, or streams in Wisconsin?

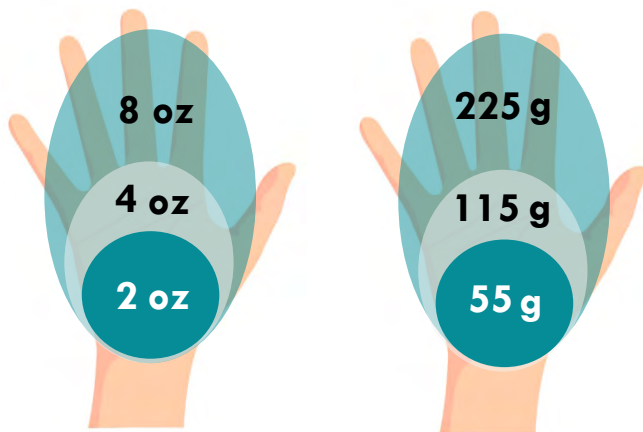
	Did not eat	1 time in last month	2 to 3 times in last month	1 time per week	2 or more times per week
 White Bass	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Buffalo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Carp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Lake Whitefish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 Channel Catfish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Eating behaviors

5. Over the **last month**, have you made any of the following changes to your eating habits to avoid chemicals, such as mercury?

	Yes	No
Eaten fewer fish meals	<input type="radio"/>	<input type="radio"/>
Eaten different types or species of fish	<input type="radio"/>	<input type="radio"/>
Avoided eating certain parts of fish (head, fat, belly, skin)	<input type="radio"/>	<input type="radio"/>
Avoided eating fish from some fishing locations	<input type="radio"/>	<input type="radio"/>

6. Please look at the images of an adult's palm, which show what different serving sizes of uncooked fish look like on the palm. The images are the same but presented in both ounces (oz) and grams (g).



Based on the images, what is the typical serving size of fish you eat in one meal?

- More than 8 ounces / More than 225 grams
- 8 ounces / 225 grams
- 4 ounces / 115 grams
- 2 ounces / 55 grams
- Less than 2 ounces / Less than 55 grams

[if **3a and **4a** were both answered “No,” skip to **9**]**

7. When preparing fish in the **last month**, how often did you or the person who prepared your fish use:

	Never	Rarely	Sometimes	Very often	Always
The skin of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The head of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The guts, organs, or other innards of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The belly fat of the fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8. When cooking fish in the **last month**, how often did you or the person who cooked your fish use the following cooking methods:

	Never	Rarely	Sometimes	Very often	Always
Smoke or dry fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pickle fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use fish to make fish paste	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pan fry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grill, or roast fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Deep fry fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boil or poach fish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Braise fish (lightly fry and then simmer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use fish or fish parts to make broth/stock, curry, or soup	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What do you know about eating fish?

9. For each statement below, please answer to the best of your knowledge.

	True	False
Women who are pregnant or breastfeeding should include fish that are low in mercury in their diets.	<input type="radio"/>	<input type="radio"/>
Older and larger fish have more chemicals than younger, smaller fish.	<input type="radio"/>	<input type="radio"/>
Mercury in fish can be reduced by using cleaning techniques.	<input type="radio"/>	<input type="radio"/>

Goals [NOT included with Group 1: No Messages]

10. In the **last month**, have you done any of the following?

	Yes	No
Eaten 1 to 2 servings (but not more) of fish every week	<input type="radio"/>	<input type="radio"/>
Chosen to eat types (species) of fish that are lower in chemicals, like mercury	<input type="radio"/>	<input type="radio"/>
Cleaned or cooked fish using ways that may lower the amount of chemicals	<input type="radio"/>	<input type="radio"/>

11. We gave you information in the first survey on how to safely eat fish. How often are you planning to follow these health messages going forward?

- Never
- Rarely
- Sometimes
- Very often
- Always

You have reached the end of the final survey. Please click “Submit.”

Completion message [Displayed on screen after final survey is submitted]

Thank you for completing our final survey!
We will review your answers.
Please check your email for a message from us on next steps.

If you have any questions or concerns, please email us at DHSFishStudy@dhs.wisconsin.gov.

Sincerely,
Wisconsin Department of Health Services' Fish Program

Completion email [Automatically emailed to participant after final survey is submitted along with their survey answers]

From: Wisconsin Department of Health Services; DHSFishStudy@dhs.wisconsin.gov
Subject: Thank you for completing Fish Survey #2

[firstname_baseline],

Thank you for taking the time to complete our final survey! We will use this information to help create materials for your community on how to safely eat fish.

Next steps:

1. We will mail you a **\$20 Walmart gift card** to the address you provided.
2. Share our screening form with friends who may qualify for the surveys and **earn a \$10 gift card for each person who participates!**
Link to screening form: <https://redcap.link/fish>

Who can participate?

Females, 18–50 years old, who:

- Identify as Chinese, Filipino, Hmong, or Karen (ethnic group from Myanmar).
- Live in Milwaukee, Waukesha, Washington, or Ozaukee County.
- Ate at least one meal of fish caught from a Wisconsin waterbody in the last 12 months.
- Did not participate in our 2022 phone survey on eating fish.

Thank you again for participating!

Wisconsin Department of Health Services' Fish Program
Email: DHSFISHSTUDY@dhs.wisconsin.gov