

Fish Consumption and Advisory Awareness Among Expectant Women

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ABSTRACT

During the spring of 2003, the Wisconsin Department of Health and Family Services (DHFS) piloted a fish consumption advisory program targeted at pregnant women. Fish consumption recommendations and information about the prenatal effects of methylmercury were illustrated in multilingual posters, brochures, fact cards, and other promotional items. These materials were mailed to Women, Infants and Children (WIC) program providers, local health departments, and medical clinics, along with a cover letter that encouraged them to display the materials in waiting areas and distribute them to new mothers and expectant women who visited their facilities. In August 2003, a survey was mailed to 1000 women who had given birth during the first week of June 2003. The survey was intended to provide an estimate of the number and types of fish meals the women had consumed during pregnancy and evaluate their familiarity with the outreach materials. On average, survey respondents consumed 3 fish meals a month. The most frequently consumed fish were canned tuna and frozen fish. Approximately one third of women knew that older fish and predatory fish have the highest levels of mercury. While almost half of the women were aware of Wisconsin's sport fish advisory, only 13% of them remembered seeing any of the outreach materials.

INTRODUCTION

Methylmercury (MeHg) is a highly toxic, organic form of mercury that is formed by bacteria found in oceans, lakes, rivers, and wetlands. It is absorbed by fish,

plankton, and other organisms and bioaccumulates in the aquatic food chain. Consumption of predatory fish is the most common source of human exposure.¹ Once ingested, MeHg is readily absorbed from the gastrointestinal tract and distributed throughout the body. MeHg is excreted very slowly, with a measurable half-life of approximately 60 days in the blood and roughly 300 days in the brain.

Prenatal exposure has been associated with delays in walking and speech as well as attention and memory deficits.^{2,3} Early exposure may also affect the development of the autonomic nervous system. A recent study conducted by Sorensen et al linked prenatal exposure to long-term alterations in blood pressure and heart rate variability.⁴ Breastfed infants continue to be exposed through MeHg excreted in breast milk and concerns have been raised about the effect of their exposure on growth and development.⁵

In older children and adults, prolonged exposure to MeHg can result in a variety of neurological symptoms including parasthesia, blurred or constricted vision, mental confusion, memory problems, poor balance and muscle coordination, difficulty swallowing food, and slurred speech.⁶ Recently completed studies suggest that frequent ingestion of mercury-contaminated fish may also increase the risk of cardiovascular disease and heart attack deaths among men.^{7,8,9}

Consumers can minimize mercury-related health risks and enjoy the nutritional benefits of omega-3 fatty acids and other nutrients found in fish and seafood by monitoring the types and quantity of fish they eat. Although numerous federal and state agencies have issued consumption advisories for commercial and sport-caught fish, public awareness and compliance with these is not well understood.

During the spring of 2003, the Wisconsin Department of Health and Family Services (DHFS) initiated a fish consumption outreach program that was targeted at pregnant women. Details regarding the selection of fish and seafood that were low in mercury as well as the negative health effects of mercury exposure were illus-

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Table 1. Monthly Fish Consumption Rates

No. Fish Meals/Month	No. (%) of Women
None	88 (12%)
1 to 2	356 (49%)
3 to 4	158 (22%)
> 4	104 (14%)
Not sure	20 (3%)

Table 2. Types of Fish Consumed

Type of Fish	No. (%) of Women Who Ate Them
Canned tunafish	535 (74%)
Shellfish	387 (53%)
Sport-caught	207 (29%)
Frozen fish	438 (60%)
Other	99 (14%)

infant during the first week of June 2003. Records for these births were provided by the Vital Records Section of the Wisconsin Department of Health and Family Services. There were a total of 1280 births, which excluded adoptions, neonatal deaths, births that involved a congenital defect, and births to residents of other states. One thousand of these births were randomly selected for the survey. Surveys were mailed out in August, approximately 2 months after the women's delivery dates, and included a cover letter, the questionnaire, and a \$2 incentive to participate. This timing was intended to improve our response rate since families often receive numerous mailings and are very busy immediately following the birth of a child. Surveys were remailed to nonresponders on August 28, 2003, and November 18, 2003. The response rate was 74%, with 726 completed questionnaires, 253 non-respondents (250 questionnaires were not returned and 3 were returned with a note of refusal), and 22 surveys that were undeliverable. Information from the questionnaires was matched with demographic data from birth certificates.

RESULTS

Demographic variables such as race, age, education level, and county of residence were used to determine whether fish consumption habits or familiarity with outreach materials differed significantly across these subgroups. The majority of the women in the study were white (90%) and had either a high school education (35%) or technical college/undergraduate education (48%). Survey data from this relatively homogenous sample did not support significant distinctions among ethnic or socioeconomic subgroups.

Wisconsin's sportfish consumption guidelines for women of child-bearing age recommend limiting meals of fish such as light tuna, cod, pollock, and sport-caught panfish to a single 6-ounce meal per week.¹⁰ Fish with moderate mercury levels, such as walleye, northern pike, bass, and albacore tuna, should be limited to 1 meal per month; and large, predatory fish like swordfish, tilefish, shark and muskellunge should be avoided altogether. Women who responded to this survey reported eating an average of 3 meals per month of fish or seafood (range 0-60). The majority of women ate fish once or twice a month (see Table 1). Tuna and frozen commercially-purchased fish were the most frequently consumed types of fish, followed by shellfish and sport-caught fish (Table 2).

Although 85% of the respondents had consumed fish during the year prior to giving birth, less than half were familiar with the outreach materials that had been sent

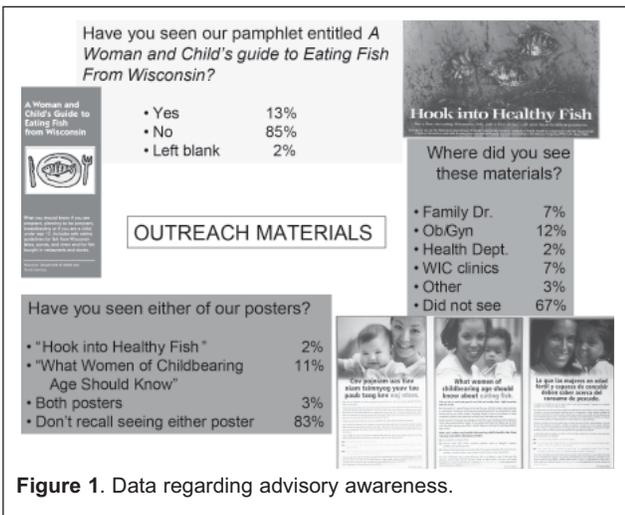


Figure 1. Data regarding advisory awareness.

trated in posters, brochures, fact cards, growth charts, and other items. These outreach materials were mailed to public and private health care professionals throughout Wisconsin during the spring of 2003. A letter accompanying the materials requested that the materials be displayed in waiting and examining rooms and distributed to women who visited their facilities. All of the materials were available in English, Spanish, and Hmong. In an effort to assess the effectiveness of this outreach effort, a survey was mailed to 1000 women who gave birth during the first week of June 2003 and were deemed likely to have visited a health care clinic several times following the statewide distribution of brochures and posters.

METHODS

The study population was selected from women who lived in Wisconsin and had given birth to a healthy

to prenatal health care professionals. Of these women, 14% of them consumed more than the recommended number of 4 fish or seafood meals in an average month. Figure 1 provides an illustration of the types of outreach materials developed by DHFS and the percentage of women who recognized each. More than 80% of the women were unfamiliar with the materials regarding fish consumption during pregnancy. Among those who recognized the materials, most had seen them posted in their obstetrician's office.

Of 207 women who included sport-caught fish in their diets, only 3% said they knew "a lot" about the Wisconsin Department of Natural Resources sportfish consumption advisory, 28% knew "something" about it, while 32% knew "only a little" and 35% knew nothing about these guidelines. When asked about their familiarity with the printed materials that had been developed by DHFS and sent to health care professionals during the spring of 2003, 79% (163) did not recall seeing either of the posters and 83% (171) were not familiar with the pamphlet.

Methylmercury differs from other environmental pollutants in that it binds to the tissue of fish rather than dissolving in fat. Toxins that build up in fat cells can be significantly reduced with proper cleaning and cooking techniques, whereas methylmercury levels cannot. The survey featured 3 multiple-choice questions to assess knowledge of mercury contamination in different types of fish. This information was included in the education materials used in this awareness campaign. Regarding the diets of fish, 22% of women answered correctly that fish that eat other fish tend to have higher mercury levels than plant-eating fish, and 33% knew that older fish have higher levels than younger fish do. Only 10% understood that mercury is tightly bound to the muscle tissue of fish and cannot be reduced by any processing techniques.

DISCUSSION

In a study by Knobloch et al, hair mercury levels were compared with fish consumption habits in 105 women of childbearing age residing in Wisconsin.¹¹ Women in this study reported consumption habits quite similar to participants in the New Mothers Survey. The average number of fish meals consumed per month was 3, and women reported consuming similar types of fish: 30% ate sport-caught fish, 54% ate shellfish, and 86% ate tuna and frozen fish varieties. Figure 2 shows a steady increase of average hair mercury levels as fish consumption increases. This data reaffirms the association with fish consumption and mercury body burdens. Although

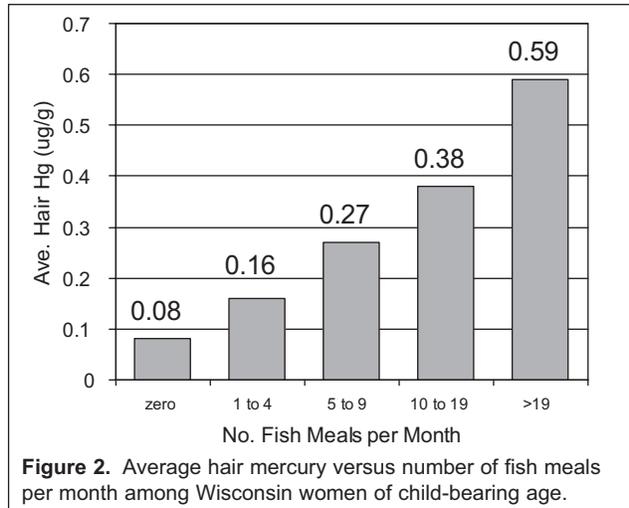


Figure 2. Average hair mercury versus number of fish meals per month among Wisconsin women of child-bearing age.

Table 3. Women's Response to the Mercury Advisory

After learning about mercury, did you change your diet?	
I didn't know about the issue	35%
Ate SAME amount of fish	27%
Ate LESS fish	15%
Ate different TYPES of fish	11%
Never ate fish	11%
Ate MORE fish	<1%

sensitivity and clearance of this toxin varies among individuals, this data is a useful tool to approximate mercury body burdens and the subsequent risk involved.

The results from this study indicate that future outreach efforts need to employ a more vigorous strategy to ensure effectiveness. Follow-up telephone calls made to several health care clinics during the summer of 2003 determined that many of the educational materials mailed to them were discarded by business office staff and never reached physicians. Thus, simply sending printed material to clinic offices with a cover letter failed to get these posters and brochures into the hands of doctors, nurses, and patients and therefore had little impact on women's dietary choices. Mailing the materials directly to physicians might have worked better. Alternatively, the advice and information could have been disseminated via a media campaign using public service announcements or paid advertisements.

Many women who participated in this research modified their diets after learning about the risks posed by mercury-contaminated fish (Table 3). One third of mothers were getting their first exposure to the issue by participating in the survey, while 26% reported pre-

viously altering their diets by eating less fish or eating different types of fish. The willingness of women to incorporate the information once exposed to it is encouraging. In the future, the use of multi-media campaigns to raise awareness, as well as the continued efforts by health care professionals to educate patients about methylmercury may prove to be an effective outreach strategy.

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