

Mercury Advisories and Fish Consumption



Patricia Javier, Hobab Lin, Rachel Smith
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Mercury: Background Info.

What is the environmental situation?

- Mercury is released into the air through industrial pollution, from mines, smelters, municipal solid waste incinerators, and fossil-fueled power plants.
- The mercury then falls from the air and can get into surface water.
- Bacteria in the water cause chemical changes that transform mercury into methylmercury, which is toxic.
- Fish absorb methylmercury from water as they feed on aquatic organisms.
- On March 15, 2005, EPA issued the Clean Air Mercury Rule, the nation's first-ever rule to regulate mercury emission from coal-fired power plants.

Who is most at risk from mercury exposure?

- Pregnant women, nursing mothers, and children
- A 2001 CDC study found that:
 - 1 in 10 American women has elevated levels of mercury in her blood.
 - Every year at least 85,000 U.S. children are born at risk of neurological damage from mercury exposure

Mercury Advisories: Background Info.

Why are advisories necessary?

- Mercury persists in the environment. Even if emissions were eliminated, mercury exposure risks would remain in the near term.
- Many fish are imported, so domestic emissions controls alone would not eliminate risk.

What advisories have been issued?

- Recently, some of California's largest grocery chains, including Safeway, Whole Foods, and Trader Joe's have started to post consumer warnings for mercury in fresh tuna, shark and swordfish.
- Stores posted warnings in response to a lawsuit filed in Jan. 2003 by an Attorney General.
- The legal basis for the suit was CA's Prop. 65, an antitoxics law passed in 1985.
- In Jan. 2001, the FDA issued a commercial fish consumption advisory, urging at risk individuals to limit fish consumption to no more than an average of 12 ounces per week.

Effectiveness of Mercury Advisories

Tufts University Econ Department Study

The Shimshack, et al. study empirically analyzes the effect of mercury advisories on consumption of fish, using graphical analyses, non-parametric statistical tests, and standard parametric analysis. Results are interpreted for economics and policy.

What the Study Looks At

Consumer Expenditure Survey: To find how consumption changed, with groups divided by:

- level of education

- health consciousness

- news readership

Policy Milestones

- laws, regulations, and advisories enacted

FDA advisory on canned fish consumption

- Shimshack, Ward, and Beatty want to test whether consumers respond to the advisories.
- Households were asked to keep track of their expenditures over a two week period.
- Samples are gathered from 1999-2002. Two years before and two years after the advisory.

Total Households: 10,537
pre-advisory: 5297
post-advisor: 5240

Empirical Analysis

- After the FDA mercury advisory, did the groups targeted directly by the advisory language respond?
- Did news readership influence consumption choices?
- Did education levels influence consumption choices?
- Did health consciousness influence consumption choice?

The Household

- households with young child or adult no older than 45 yrs of age
- Excluded households:
 - samples with more than 12 members
 - households with 3 or more adults
 - households with multiple married adults
 - incomplete diaries, or no reports of in-home food purchases

Targeted Groups:

- Households with young or nursing children
- women who are pregnant or may become pregnant

Control Group: childless married women less than 45 years of age

How did consumers respond?

- compare educated vs less educated households
- health conscious consumers vs other consumers
- dummy for newspaper or magazine purchases, dummy for college grads,

Ad-hoc for health consciousness

Table 2. Summary Statistics⁸

Variable	Description	ENTIRE SAMPLE		PRE-ADVISORY		POST-ADVISORY	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
PURCHASED?	Dummy; '1' if canned fish purchased in 2-week diary period, '0' otherwise	0.168	0.374	0.169	0.375	0.167	0.373
QUANTITY	Canned Fish Quantity (lbs.)	0.264	0.758	0.252	0.724	0.275	0.789
	Quantity Conditional on Purchase (lbs.)	1.57	1.17	1.49	1.12	1.64	1.21
SHARE	Canned Fish Expenditure Share	.004	0.017	.004	0.016	.004	0.017
	Share Conditional on Purchase	.026	0.033	.025	0.032	.027	0.034
PRICE	Real Regional Price (per lb.)	1.94	0.155	2.02	0.139	1.86	0.133
SUB PRICE	Index of Substitute Prices – Base Period Normalized to 1	1.09	0.057	1.04	0.030	1.14	0.034
FOOD	Real In-home Food Expenditures (\$100s)	1.15	0.967	1.15	0.974	1.14	0.961
AGE	Age of Respondent	38.8	13.4	38.6	13.4	38.9	13.3
CHILDREN	Dummy; HH with Young/Nursing Child?	0.303	0.458	0.306	0.461	0.300	0.458
READER	Dummy; Newspaper or Magazine Purchase?	0.242	0.428	0.249	0.432	0.235	0.424
EDUCATED	Dummy; Respondent College Graduate?	0.299	0.458	0.290	0.454	0.308	0.462
HEALTHY	Dummy; Particularly Healthy Household?	0.225	0.418	0.225	0.418	0.225	0.418
RCHILD	Reader/Children Interaction	0.078	0.268	0.081	0.273	0.074	0.262
ECHILD	Educated/Children Interaction	0.097	0.296	0.093	0.290	0.101	0.301
HCHILD	Healthy/Children Interaction	0.076	0.266	0.079	0.270	0.074	0.262
PERSONS	Number of Equivalent Adults	1.90	0.906	1.91	0.908	1.90	0.905

On average, the real prices of canned fish fell and substitute prices rose!

TESTS

- Examine change in the distribution of pre- and post-advisory consumption
- Comparison of Means

Figure 1. Empirical cdfs: Overall

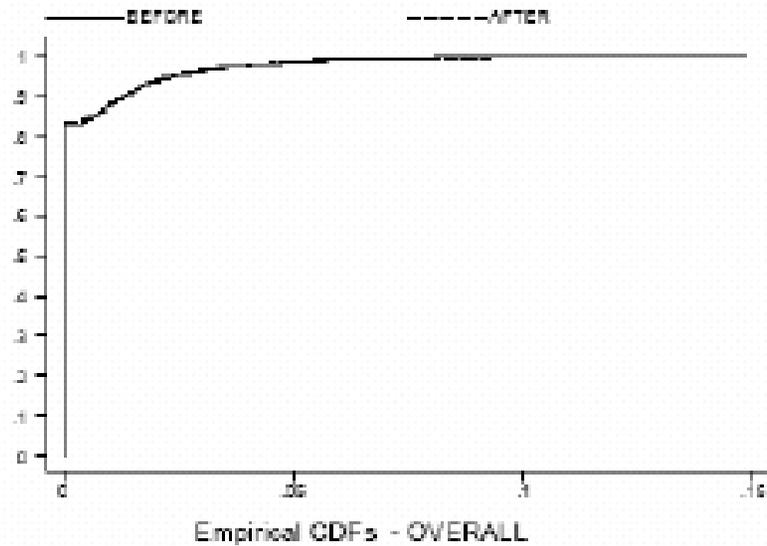
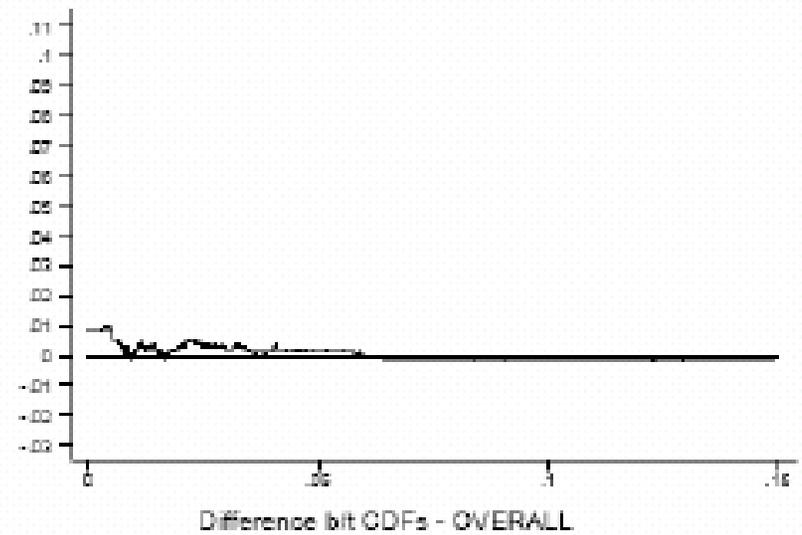


Figure 2. Difference Graph: Overall



Mean Comparison Test

- Test the mean reduction in overall share of food consumption allocated to fish
- For subscript 0 indicating 'pre-advisory', subscript 1 indicating 'post-advisory,' and \bar{X} indicating mean fish expenditure share, this test statistic would be $\bar{X}_0 - \bar{X}_1$ and its value correspond to the net sum of the integrated area in Fig 2.

$$(\bar{X}_0 - \bar{X}_1) - (\bar{Y}_0 - \bar{Y}_1).$$

Where X is the main group of interest, and Y is the mean for the control group.

Test is applied in 3 ways:

- 1) compare unconditional double-differenced means
- 2) apply the same comparisons to means conditional on canned fish.
- 3) apply analogous comparisons to the number of consumers purchasing any canned fish

Control group Null Hypothesis:

- 1) No change in mean consumption
- 2) No change in mean consumption, conditional on purchase
- 3) No change in the percent of the group purchasing any canned fish

Regression Methods

- *Dependent Variable* – quantity purchased based on expenditure
- *Independent variables* – price, substitute prices, total food expenditures,

Region, household demography

Zero Purchases:

- Infrequency of Purchase
- abstaining of good entirely

Result 1

- Information-based policies can be effective
 - Targeted consumers most likely to be aware of and understand the advisory responded by significantly reducing fish consumption.
 - College-educated consumers
 - Mean canned fish expenditure fell by 29%
 - Newspaper and magazine readers
 - Mean canned fish expenditure fell by 19%

Result 2

- Information policies have pronounced distributional consequences
 - Certain groups are more exposed to mercury damages because advisories do not reach them.
 - Consumers with less than college education
 - Consumers that do not read newspapers or magazines

Result 3

- Information advisories produce significant unintended spillover effects
 - Effects on the fish market
 - On average, the real price of canned fish fell and substitute prices rose.

Solution

- Broader and more targeted educational outreach program is necessary to reach more vulnerable members of society.
 - Health-advertising campaigns
 - In-store advisory signs
 - Labelling
 - Malthios (2000)
 - Teisl
 - Spillover effects must be taken into consideration

Resources

- Jay P. Shimshack, et al., “Are Mercury Advisories Effective? Information, Education, and Fish Consumption”, Jan. 2005, Dept. of Economics, Tufts University
- U.S. EPA, Mercury Laws and Regulations webpage, <http://www.epa.gov/mercury/regs.htm>
- FDA Consumer Advisory webpage, <http://www.cfsan.fda.gov/~dms/admehg.html>
- Jane Kay, “Grocers post mercury warnings on fish; Safeway and others respond to state suite” S.F. Chronicle, Feb. 21, 2003, <http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2003/02/21/MN149767.DTL>