# Trust in Food-Safety Information Sources: Examining Differences in Respondents' Opinions from a Three-State Survey

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This paper analyzes data from a telephone survey of 1,000 home-meal preparers from Alabama, North Carolina, and Tennessee. We evaluate the level of trust assigned by survey respondents to twelve sources used in gathering food safety information and provide guidance on effective ways of communicating food-safety information. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS). Health professionals, nutrition counselors, and food labels were highly trusted sources of food-safety information while the Internet, radio, and television were the least trusted.

In recent years, ensuring the safety of the food bought and consumed has become an important area of concern (USDA-ERS n.d.; USDA-FSIS 2001). Although the U.S. has one of the safest food supplies in the world and enjoys a high standard of consumer protection, the numerous recalls of beef contaminated with E-coli have raised renewed concerns about food safety. Citation of a few instances of recent recalls are worthy of note here. A September 2007 Class I[1] recall (USDA-FSIS 2007b) of 21.7 million pounds of frozen ground beef due to possible E-coli contamination eventually led to the demise of the Topps Meat Company, LLC of Elizabeth, New Jersey. In October 2007, a Coal Valley, Illinois company, I & B Meats Corporation, voluntarily issued what the USDA noted as a Class I recall of 173,554 pounds of frozen ground beef precuts due to possible contamination (USDA-FSIS 2007a, 2007b). Too many recalls have occurred in the last few years to provide a complete reference in this short paper. Needless to say, however, they have increased awareness and concerns about the general safety of food both domestic and imported. The U.S. Health and Human Services (HHS) Secretary, Mike Leavitt noted in 2007 that "the American people have a reasonable expectation that the food and products they buy are safe. We need to continually improve our import safeguards to meet the changing demands of a global economy." In continued efforts to ensure that food is safe, the Interagency Working Group on Import Safety, consisting of twelve federal departments and agencies, was established on July 18, 2007 by Executive Order 13439. The group will review what is currently being done to promote import safety, review practices and determine where improvements need to be made. This approach will examine import safety from the exporting country; importing companies; and the federal, state and local governments.

Many consumers are still worried about the safety of the food they consume. This concern is highlighted by the fact that about 67 percent of present study participants were either "concerned" or "very concerned" about food safety. Coupled with the concern is the amount of trust that consumers put in the sources of the food-safety information they gather. In pursuing this interest, study participants were asked to rate the level of trust for twelve sources of food-safety information using a five-point Likert scale with responses ranging from "no trust" to "high trust." Using the Statistical Package for the Social Sciences (SPSS), a logistic regression model was fitted to data to investigate what, if any, relationships exist between select socio-economic variables and the degree of trust.

[1] Recall classifications: **Class I** is a health-hazard situation where there is a reasonable probability that the use of the product will cause serious, adverse health consequences or death. **Class II** is a health-hazard situation where there is a remote probability of adverse health consequences from the use of the product. **Class III** is a situation where the use of the product will not cause adverse health consequences.

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Opinion surveys have been used extensively in research in all disciplines including agriculture. When used correctly, the technique can generate useful information (see, for example, Mindfully.org 1999 and Pew Initiative 2006).

Trust is an important part of opinion surveys. In a Pew Initiative to assess consumers' trust in information sources on modified foods, consumers were asked to indicate how much they trusted friends and family, scientists and academics, news media, food manufacturers, biotech companies, and government regulators for biotech information. Articles of this nature provided some guidance as to what sources of information could be included in a trust survey of the nature reported here. In assessing trust of information, twelve sources of food-safety information were evaluated. The data and methods used in this study are reported in the following section. .

**Data and Methodology**

A telephone survey was used to collect information from 1,000 primary food preparers in Alabama, North Carolina and Tennessee. A random sample of listed and unlisted telephone numbers was used in selecting willing study participants. Questions were read to participants and responses were recorded. The surveys were administered by trained personnel from a private research firm. Data were collected between August and September, 2005.

Descriptive analysis of data collected showed that participants ranged in age from 18 through 90, with an average age of 49.5 years. On average, there were two adults residing in each household, with a range of one to seven adults. Only 12.6 percent of respondents had someone over 65 years old living in their household. Asked if there were any persons 18 years or younger in the household, 33.2 percent indicated that they did. As for infants living in the household, 22.3 percent said that they had someone two years or younger living in the house. Caucasians constituted 81.5 percent of the respondents. Demographic information details are provided in Table 1.

While 50.1 percent of respondents identified themselves as residing in rural areas/small towns, 49.8 percent indicated that they lived in urban areas. Study participants were asked to rate their level of trust for twelve food-safety information sources using a five-point Likert scale ranging as follows: 0 = do not know/refused to answer, 1 = "no trust," 2 = "low trust," 3 = "moderate trust," 4 = "high trust." The twelve sources of information were newspapers and magazines, word-of-mouth from family and friends, television and radio, Internet, grocers/person cutting your meat, university scientists/professors, extension professionals and paraprofessionals, USDA scientists, consumer groups, health professionals, nutritional counselors, and food labels. Mean trust values were calculated after responses of "0 = do not know/refused" were eliminated. Values closer to four would indicate high trust while those closer to one would indicate no trust. Health professions enjoyed high trust (3.52) from food preparers, followed by nutritional counselors (3.27), food labels (3.26), and USDA scientists (3.23). Food preparers showed a moderate trust in extension professionals and paraprofessionals with a mean rating of 3.13, followed by word-of-mouth from family and friends (3.05) and university scientist and professors (3.03). The Internet was the least trusted, showing a mean response of 2.46; television/radio generated a mean response of 2.82. A detailed trust ranking is provided in Table 2.

Since the focus of the analysis is to investigate what factors can be used in explaining the trust of the information source, a recoding of the dependent variable into a dichotomous variable was used in implementing a logistic regression to analyze the data. Analysis was conducted on the twelve sources of information provided to respondents. The reclassification of the dependent variable into a dichotomous or discrete response variable was implemented as follows: if respondents answered to the question on trust with "moderate" or "high" trust the response was recoded to 1 = "trust," and if "low" or "no trust" was selected the response was recoded to 0 = "no trust." The mean responses of recoded variables are shown in Table 3. After recoding the independent variables, the level of trust for health professionals, nutrition counselors, and food labels were almost identical across the three states, representing the three most trusted information sources.

**Theoretical Framework**

Applicable to a broad range of research situations, logistic regression analysis can be applied where the

**Table 1. Responses to Survey Questions.**

| Variable | percentage* |
|---|---|
| Gender | |
| Male | 21.1 |
| Female | 78.9 |
| Place of residence | |
| Rural area/small town | 50.1 |
| Urban area | 49.8 |
| Educational attainment | |
| High school or less | 38.1 |
| Vocation/technical school | 3.8 |
| Some college | 22.7 |
| College undergraduate degree | 18.1 |
| Post-graduate/professional degree | 17.3 |
| Marital Status | |
| Married | 66.9 |
| Otherwise | 33.1 |
| Household member | |
| Older than 65 years | |
| Yes | 12.8 |
| No | 87.4 |
| Eighteen or younger | |
| Yes | 33.2 |
| No | 66.8 |
| Two years or younger | |
| Yes | 22.3 |
| No | 77.7 |
| Race | |
| Caucasian/White | 81.5 |
| Otherwise | 18.5 |
| Of Hispanic origin | |
| Yes | 1.6 |
| No | 98.4 |

*Based on actual responses to questions. Numbers may not add up to 100 percent due to rounding errors.

**Table 2. Mean Response to Trust of Source Used for Food Safety Information.**

| Source | Mean response* | Standard deviation |
|---|---|---|
| Newspapers and magazines | 2.87 | 0.748 |
| Word-of-mouth from family and friends | 3.05 | 0.781 |
| Television and radio | 2.82 | 0.743 |
| Internet | 2.46 | 0.982 |
| Grocers/person cutting your meat | 2.94 | 0.912 |
| University scientists/professors | 3.03 | 0.947 |
| Extension professionals and paraprofessionals | 3.13 | 0.875 |
| USDA scientists | 3.23 | 0.879 |
| Consumer groups | 2.98 | 0.794 |
| Health professionals | 3.52 | 0.686 |
| Nutritional counselors | 3.27 | 0.835 |
| Food labels | 3.26 | 0.743 |

* Based on a sample size of n = 793; 1 = "no trust," 4 = "high trust."

**Table 3. Values of Recoded Variables: Overall and State Differences in Means.**

| Source | Overall mean response* | State-specific responses | | |
|---|---|---|---|---|
| | | TN | NC | AL |
| Newspapers and magazines | 0.804 | 0.813 | 0.811 | 0.778 |
| Word-of-mouth from family and friends | 0.824 | 0.842 | 0.836 | 0.778 |
| Television and radio | 0.764 | 0.769 | 0.775 | 0.744 |
| Internet | 0.592 | 0.591 | 0.587 | 0.600 |
| Grocers/person cutting your meat | 0.776 | 0.787 | 0.769 | 0.762 |
| University scientists/professors | 0.771 | 0.781 | 0.784 | 0.736 |
| Extension professionals and para-professionals | 0.832 | 0.833 | 0.819 | 0.843 |
| USDA scientists | 0.850 | 0.863 | 0.839 | 0.835 |
| Consumer groups | 0.812 | 0.824 | 0.788 | 0.812 |
| Health professionals | 0.939 | 0.941 | 0.923 | 0.951 |
| Nutritional counselors | 0.873 | 0.885 | 0.858 | 0.864 |
| Food labels | 0.901 | 0.909 | 0.875 | 0.912 |

*Values closer to 1 indicate trust while those closer to 0 indicated low trust.

dependent variable is of a dichotomous nature. The coefficients of the regression can be used to estimate the odds ratios for each of the independent variables included in the model (SPSS 2005; Greene 2008; Gujarati 2003). The general binary-choice model to be estimated is as

(1) Prob(event j occurs) = Prob(Y = j) = F(relevant effect:parameters) .

In our model, the respondent either trusts the source of information (Y = 1) or does not (Y = 0). The general model can be re-written as

(2) $\text{Prob}(Y=1) = F(\boldsymbol{\beta}'\mathbf{x})$ ,

(3) $\text{Prob}(Y=0) = 1 - F(\boldsymbol{\beta}'\mathbf{x})$ .

The set of parameters, **β**, reflects the impact of changes in the independent variable **x** on the probability. A linear expression of the form $F(\mathbf{x}, \boldsymbol{\beta}) = \boldsymbol{\beta}'\mathbf{x}$ will be estimated. Since $E[y|x] = F(\mathbf{x}, \boldsymbol{\beta})$, we use a regression model of the form (see Greene 1997)

(4) $y = E[y|x] + (y - E[y|x]) = \boldsymbol{\beta}'\mathbf{x} + \varepsilon$ .

According to Steigert, Ardalan, and March (2006), the marginal effect in probability terms can be calculated as

(5) $\partial/\partial x(\text{Prob}\,(Y=1|x)) = \boldsymbol{\beta}^*[e^{-x\beta}/(1+ e^{-x\beta})^2]$ .

The logistic regression was run on food labels to investigate factors influencing the choice. All estimations were implemented using the Statistical Package for the Social Sciences (SPSS).

**Results and Discussion**

Values taken on by recoded independent variables are shown in Table 4 and estimates of the regression are presented in Table 5. The logistic regression model estimated showed overall significance with a chi-square value of 299.891, $p \leq 0.005$. Model summary estimated showed the −2 Log-likelihood to be equal to 164.517 and Negelkerke $R^2 = 0.789$. This is an excellent value for cross-sectional data of the nature used in estimations. Age, presence of children less than two years old in the home, and gender were significant ($p \leq 0.05$) in the logistic regression estimates. The estimated odds ratio, calculated as $e^{\beta}$ for age, presence of children less than two, and gender were 0.971, 3.474 and 2.494, respectively. Education and marital status were significant at $p \leq 0.10$ level of significance with log ratios of 1.256 and 0.722, respectively. Marginal probabilities are displayed in Table 5. Results indicate that rural residents were less likely to trust food labels as a source of food-safety information. Older persons were also less likely to trust labels, while respondents with college degrees were more likely to trust food labels for food-safety information. Females were more likely than males to trust food labels and unmarried respondents were less likely to trust food labels as a food-safety information source. Consistent with expectations, households with no children less than 2 years old were less likely to trust food labels.

**Table 4. Recoded Independent Variables Used in Estimating the Logistic Regression.**

| Variables | Recoded values |
|---|---|
| Place of residence | 0 = urban, 1 = rural |
| Anyone 65+ years in household | 0 = yes, 1 = no |
| Level of education | 0 = less than college, 1 = college/post-graduate |
| Anyone 18 years or younger | 0 = yes, 1 = no |
| Marital status | 0 = married, 1 = otherwise |
| Anyone 2 years or younger in household | 0 = yes, 1 = no |
| Race | 0 = Caucasian, 1 = otherwise |
| Gender | 0 = male, 1 = female |

**Table 5. Coefficients of Estimated Logistic Regression.**

| Dependent Variable: Trust in Food Labels as source of food safety Information | | | | | |
|---|---|---|---|---|---|
| Independent variable | Coefficient β | Wald | Exp(β) | p-value | Marginal prob. |
| Rural vs. urban | -0.063 | 0.053 | 0.939 | 0.819 | 0.0148 |
| Age | -0.030 | 3.990 | 0.971 | 0.046** | 0.0073 |
| Education | 0.228 | 2.894 | 1.253 | 0.089* | 0.0705 |
| Marital status | -0.325 | 2.842 | 0.722 | 0.092* | 0.0571 |
| Children (< 2yrs) | 1.245 | 8.094 | 3.474 | 0.004** | 0.7506 |
| Ethnicity | 0.023 | 0.012 | 1.023 | 0.912 | 0.0059 |
| Gender | 0.913 | 5.621 | 2.492 | 0.018** | 0.4650 |

* $p \leq 0.1$; ** $p \leq 0.05$.

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