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Demographics of Household Attitudes towards Food Defense

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Paper presented at the 10<sup>th</sup> Joint Conference on Food, Agriculture and the Environment,  
Duluth, Minnesota, August 27-30, 2006.

# *Demographics of Household Attitudes towards Food Defense*

Rachael Dettmann and Thomas Stinson<sup>1</sup>

## **Abstract**

Literature examining demographics of consumers most concerned about acts of agro terrorism or terrorism in general is limited due to inadequate data. A first effort to fill this information gap was made possible by a 2005 survey conducted by the University of Minnesota. The “National Survey of Attitudes of U.S. Residents about Terrorism.” surveyed 4,260 Americans. Results showed 31 percent of respondents were not confident their food supply was secure from acts of terrorism, while 77 percent felt an act of food terrorism would occur in their lifetime.

This paper is divided into three sections of analysis. First, the demographics of surveyed respondents who believe an agro terrorist attack will occur within the next four years are reported. Second, the level of concern respondents have regarding how secure the food supply is from terrorist attacks is incorporated. Lastly, the impact additional information has on how respondents allocate money towards food defense is explored. Specifically, we investigate whether the size of respondent’s communities and their general attitude towards the safety of the food supply has any impact on their level of concern towards the security of their food supply. Other demographics analyzed include gender, education level, race and primary source of news information. Binary logistic models are used in all stages of analysis. Initial findings suggest demographics have little impact on who is most likely to believe an agro terrorist event will occur in the next four years, while regional market size, education, race and age were the demographics of those most concerned about acts of agro terrorism. The final stage of analysis reported females and well educated individuals were most likely to allocate more money towards protecting the food supply from acts of agro terrorism when additional information was provided.

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## **Introduction**

Agro terrorism—the deliberate contamination of a food supply with the goal of instilling fear, causing economic loss, and loss of human life—is a form of terror Americans have yet to experience. However, they are concerned about its potential. The United States food supply is an inviting target with vulnerable supply chain networks, unsecured farms and few resources currently being devoted to securing our food supply against attacks (Monke 2005).

Terrorist attacks on food supply chains could produce declines in consumer confidence, leading to decreases in food sales, losses in trade, and incur large disposal costs of contaminated products such as livestock or other goods (Monke 2005, Chalk 2005). More than food would be affected. Decreases in consumer confidence, leading to declines in consumption pose the potential for long lasting economic impacts. Stinson (2005) estimates shocks such as terrorist events can cause economic losses in consumer confidence, leading to declines in real GDP that total \$200 billion with these declines lasting up to a year after the initial shock. Understanding demographics of consumers most concerned about acts of agro terrorism is instrumental in minimizing potentially devastating losses in consumption and national economic activity. Such information is helpful in designing effective risk communication policies during a potential terrorist event. It may also aid in forming sound policies targeted to further protect our food supply and ensuring consumer confidence.

There is little information about demographic characteristics of consumers most concerned about acts of agro terrorism, or even terrorism in general. However, in 2005 economists from the University of Minnesota surveyed 4,260 Americans in the “National Survey of Attitudes of U.S. Residents about Terrorism.” Results show 31 percent of respondents were not confident their food supply was secure from acts of terrorism, that 77 percent feel an act of food terrorism will occur in their lifetime and that 43 percent believe such an attack will occur within the next four years.

This paper is divided into three sections of analysis. First, the demographics of surveyed respondents who believe an agro terrorist attack will occur within the next four years are reported. Second, the level of concern respondents have regarding how secure the food supply is from terrorist attacks is incorporated. Lastly, the impact additional information has on how respondents allocate money towards food defense is explored. Specifically, we investigate whether the size of respondent’s communities and their general attitude towards the safety of the

food supply has any impact on their level of concern towards the security of their food supply. Other demographics analyzed include gender, education level, race and primary source of news information. Binary logistic models are used in all stages of analysis.

## **Literature Review**

There have been no published empirical studies identifying the characteristics of those consumers extremely concerned about agro terrorism. However, the way consumers perceive risk plays an integral role in determining the level of individual concern. There are many theories regarding consumer risk perception in terms of food contamination. The knowledge deficit model (Einsiedel, 2000; Hilgartner, 1990; Wayne & Irwin, 1996) is referenced widely within government policy and food industry (Hansen et al, 2003). The model assumes less educated consumers are more likely to be anxious about food contamination because they lack expert knowledge of the situation. Critics of this model argue that lay people can differ from experts in their perception of risk for reasons other than education, and that lay people might lack trust in expert opinions.

Sparks and Shephard (1994) offer a different approach toward food related risk perception. They suggest variation in consumer risk perception pertaining to food scares can usually be accounted for by three factors: the severity of food scare, unknown risks associated with contamination, and the number of people exposed. Sparks and Shephard's work is often associated with the psychometric approach to understanding variances in consumer risk perception. This approach is generally aimed at exploring differences between lay and expert opinions in risk perception. It tries to identify reasons why people's opinions in risk perception differs other than a lack in expert advice as suggested by the deficit models.

Variation in factors such as trust and optimistic bias are often cited as explanations for differences in consumer risk perception and as hindrances to effective risk communication. The degree which consumers trust food regulatory bodies and communication sources plays an integral role in the level of consumer concern displayed in a food contamination event. If consumers lack trust in regulatory bodies, they are less likely to listen to warnings displayed regarding the safety of their food supply and therefore could display signs of optimistic bias. Optimistic bias is defined when people believe they are immune to a hazard, they are less likely to take advice to avoid a hazard and continue to engage in risky behavior.

Outlining ideas behind consumer risk perception is an important step before analyzing consumer demographics of concern and may provide explanation of the presented results.

### **Data Overview:**

In August 2005, economists at the University of Minnesota conducted an internet survey of 4,260 Americans between the ages of 18 and 93. Survey participants were randomly selected from a pre-screened group recruited by TNS-NFO organization. Respondent answers were weighted to represent the national population.<sup>2</sup>

Demographic variables included education level, geographic market size, primary news source from which the respondent received information, race, age and sex. The sample was 68 percent female and 32 percent male. Participant age was grouped into three categories, 17 percent were less than thirty, 66 percent were between 31, and 60 and 17 percent were 61 or older.

Racial composition was comprised of 75 percent white/non-hispanic, 12 percent black, seven percent white and six percent other racial compositions. Basic demographics such as sex, age, and race were included given the hypothesis they would have an impact on whether respondents were concerned about acts of agro terrorism and their level of concern.

The variable regional market size was a combination of market size, the population of area in which the respondent resides and the geographic location of the respondent. Four markets were used: Market 1 was under 100,000, market 2 was between 100,000-499,999, market 3 was between 500,000-1,999,999 and market 4 was 2,000,000 and greater. There were also four different geographic locations of west, midwest, northeast and south. Combined together, there were 16 different regional market size variables. It was hypothesized smaller communities in the midwest were more fearful of acts of agro terrorism due to greater direct contact with the agriculture sectors when compared to higher populated geographic regions.

Education was included with the thought that individuals with less education would be more anxious about acts of agro terrorism. This hypothesis was drawn from the knowledge deficit model detailed above. Most respondents had attended college; 36 percent had at least a four year degree and an additional 43 percent had some college education. Only 21 percent had a high school education or below.

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<sup>2</sup> Weights were constructed by TNS-NFO who conducted the survey via internet.

Primary source of news information was divided into five categories: Internet, radio, newspaper, television, and other. The majority of respondents, 58 percent, received their information from television; while 16 percent received their news from newspapers, 18 percent from the internet, 6 percent from the radio and 1 percent from other news sources such as religious institutions. Analysis of these variables will aid in understanding the most effective media channel to use in reaching and reassuring those most concerned about agro-terrorism.

## **Results**

### **Analysis I**

The first portion of analysis tests the hypothesis that demographic factors influence the likelihood of believing an agro terrorist attack will occur within the next four years and relies on a binary logistic model to gain such insight. The dependant variable  $p_1$  is a binary variable, which reflects whether the respondent believes an agro terrorist attack would occur within the next four years (1) or not (0). Twenty seven independent demographic variables, as detailed in the previous section, were included in the regression.

The logit regression (results shown below) reported the odds of each variable contributing to the respondent's belief that an agro terrorist attack would occur within the next four years. Of the twenty seven independent variables analyzed, only one was statistically significant at a one percent level, respondents aged less than 30. Younger respondents were .52 times less likely to think an agro terrorist attack would occur in the next four years. These results demonstrate demographics have little impact on whether respondents believe an agro terrorist attack will occur within the next four years. Regardless of race, education, sex, or regional market size, 43 percent of respondents believe an agro terrorist attack will occur within the next four years.

## Results Analysis I

<b>Variable</b>	<b>Odds Ratio</b>
West region/Market size 1	1.62
West region/Market size 2	1.11
West region/Market size 3	1.27
West region/Market size 4	1.13
South region/Market size 1	0.95
South region/Market size 2	1.13
South region/Market size 3	1.09
South region/Market size 4	1.06
Midwest region/Market size 1	0.91
Midwest region/Market size 2	1.31
Midwest region/Market size 3	1.28
Midwest region/Market size 4	1.37
Northeast region/Market size 1	1.44
Northeast region/Market size 2	1.37
Northeast region/Market size 3	1.17
News source: Internet	1.26
News source: Radio	1.33
News source: Newspaper	1.32
News source: TV	1.27
College Degree or More	0.88
High School Education or Less	1.15
Race: Black	1.01
Race: White	1.00
Race: White/non-Hispanic	1.2
Female	1.1
<b>Age: Less than 30</b>	<b>0.52</b>
Age: Between 31 and 60	1.03
<b>Observations</b>	<b>4,260</b>
<b>Pseudo R<sup>2</sup></b>	<b>0.0177</b>

\* denotes statistical significance at 5% level

\*\* denotes statistical significance at 1% level



## Analysis II

The second portion of analysis was meant to reflect the *level* of confidence certain respondent demographics had towards the security of their food supply. The dependant variable was created from a combination of two survey questions into one dummy variable. The first survey question asked “How confident are you that our food supply is secure against terrorism,” on a scale from 1 (not at all confident) to 6 (extremely confident). If respondents answered they were not confident (1) a dummy variable was created. This variable was then combined with the dependent variable from analysis I to identify the set of individuals who believe an agro terrorist attack will occur in the next four years and who are not at all confident the level of security within the food supply chain is sufficient in preventing such events. This dependent variable was regressed against the same 27 demographic variables employed in previous analysis.

Regional market size, education level, race and age had the strongest statistical impact on the level of confidence respondents had towards the security of the food supply. Respondents living in the Northeastern region of the United States within small communities<sup>3</sup> were 2.5 and 3.8 times more likely to be not at all confident in the security of their food supply. These results were interesting when taking into account the Northeastern region is the only region in the United States that have experienced a terrorist attack<sup>4</sup>. It is understandable that this region is more likely to be concerned about any act of terrorism, including contamination of the food supply, as they are more aware of terrorist attacks.

Individuals with a high school education or less were 45% more likely to have little confidence in food security. White respondents were 2.12 time more likely to have low confidence in food security. Younger respondents (less than 30 years old) and middle aged respondents (between 31 and 60 years old) were 0.76 and 0.35 times less likely to have minimal confidence in the security of their food supply.

From this analysis, individuals who reside in smaller Northeastern markets, who have a high school education or less, who are white and aged 60 or below are likely to convey the lowest levels of confidence in the security of their food supply from acts of agro terrorism.

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<sup>3</sup> Small market sizes are defined as markets with populations of 100,000 or below, or between 100,000-499,999.

<sup>4</sup> 9/11 plane bombings in New York City

## Results Analysis II

<b>Variable</b>	<b>Odds Ratio</b>
West region/Market size 1	1.56
West region/Market size 2	1.16
West region/Market size 3	1.5
West region/Market size 4	1.87
South region/Market size 1	1.95
South region/Market size 2	1.63
South region/Market size 3	1.36
South region/Market size 4	1.3
Midwest region/Market size 1	1.26
Midwest region/Market size 2	1.36
Midwest region/Market size 3	1.35
Midwest region/Market size 4	1.01
<b>Northeast region/Market size 1</b>	<b>2.5</b>
<b>Northeast region/Market size 2</b>	<b>3.85</b>
Northeast region/Market size 3	1.51
News source: Internet	0.6
News source: Radio	0.65
News source: Newspaper	0.5
News source: TV	0.72
College Degree or More	0.86
<b>High School Education or Less</b>	<b>1.45</b>
Race: Black	2.18
Race: White	1.09
<b>Race: White/non-Hispanic</b>	<b>2.12</b>
Female	1.12
<b>Age: Less than 30</b>	<b>0.76</b>
<b>Age: Between 31 and 60</b>	<b>0.35</b>
<b>Observations</b>	<b>4,260</b>
<b>Pseudo R<sup>2</sup></b>	<b>0.379</b>

\* denotes statistical significance at 5% level

\*\* denotes statistical significance at 1% level

### **Analysis III**

For the third stage of analysis, we wanted to find the demographics of individuals who increased their allocation of spending towards food defense after their level of information increased. To construct the dependent variable, two survey questions asking how much respondents were willing to allocate towards protecting the country from acts of agro terrorism were combined to form a dummy variable.

Construction of the dependent variable is as follows: Respondents were asked on two separate occasions to allocate \$100 to protect the country from terrorism over seven different types of attacks within the survey. The allocation of funding to protect the country from acts of agro terrorism was used to construct the dependent variable. The first time the allocation question was asked, no knowledge was provided of potential impacts of agro terrorism. The second time the question was asked, respondents were provided with an agro terrorism scenario that resulted in 1,500 human deaths. If respondents increased their funding allocation by \$5 or more in their second response they were assigned a 1 in the dependent dummy variable.

Education and sex of respondents were the statistically significant variables within this analysis. Respondents with a college degree or more were 0.81 times less likely to increase their spending towards food terrorism protection. Females were 9/11 plane bombings in New York City 47% more likely to increase their allocation towards food defense.

### Results Analysis III

<b>Variable</b>	<b>Odds Ratio</b>
West region/Market size 1	0.95
West region/Market size 2	0.61
West region/Market size 3	0.83
West region/Market size 4	0.93
South region/Market size 1	0.83
South region/Market size 2	1.08
South region/Market size 3	0.91
South region/Market size 4	0.88
Midwest region/Market size 1	0.80
Midwest region/Market size 2	0.99
Midwest region/Market size 3	0.91
Midwest region/Market size 4	1.01
Northeast region/Market size 1	0.92
Northeast region/Market size 2	1.28
Northeast region/Market size 3	1.12
News source: Internet	0.77
News source: Radio	1.02
News source: Newspaper	0.93
News source: TV	0.94
<b>College Degree or More</b>	<b>0.81</b>
High School Education or Less	1.13
Race: Black	1.0
Race: White	0.81
Race: White/non-Hispanic	0.96
<b>Female</b>	<b>1.47</b>
Age: Less than 30	0.8
Age: Between 31 and 60	0.9
<b>Observations</b>	<b>4,260</b>
<b>Pseudo R<sup>2</sup></b>	<b>0.0141</b>

\* denotes statistical significance at 5% level

\*\* denotes statistical significance at 1% level

## **Conclusion**

This analysis has established there are demographic sets of people who believe an agro terrorist event will occur within the next four years, who are least confident in the security of our food supply from agro terrorist attacks and those who, once informed about the potential impacts of an agro terrorist event, allocate more money towards food defense.

Given the previous analysis, the demographics that had an impact on whether respondents felt an agro terrorist attack would occur within the next four years were 9/11 plane bombings in New York City those who were below the age of 31. Respondent age provided interesting results since younger respondents were more likely to think an agro terrorist event would occur in their lifetime, which dismisses our theory of younger respondents exhibiting optimistic bias. Within this survey demographics had little impact on whether respondents believed an agro terrorist attack will occur within the next four years.

Conversely, the demographics of respondent confidence levels towards the security of our food supply from acts of agro terrorism were: regional market size, education, race and age. Young to middle aged individuals were more confident about the security of our food supply than individuals over the age of sixty. Conversely, white individuals with low levels of education residing in smaller Northeastern markets were likely to convey the lowest levels of confidence in the security of their food supply from acts of agro terrorism, and therefore more concerned about such acts of terrorism. These results concur with the knowledge deficit model of risk communication that less educated individuals are more likely to be anxious about food contamination because they lack expert knowledge to understand the situation.

Our final stage of analysis conveyed females likely to allocate more money towards protecting the food supply from acts of agro terrorism when additional information was provided. Respondents with a college degree or greater were less likely to allocate more money towards food protection with the knowledge of additional information. With an increase in funding towards food defense due to respondents being informed with additional information, it could be argued the amount of money an individual is willing to allocate towards food defense is an indicator of the level of concern an individual has towards agro terrorism.

Since specific demographic groups have been established in relation to issues conveying food terrorism, these results can greatly aid in forming effective risk communication strategies in the event of an agro terrorist attack. Other future work will revolve around the relation of

consumption and agro terrorism. Research will focus on creating a model that predicts how long it takes consumers to reach normal levels of consumption after an agro terrorist event occurs.

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