

The Analysis of Socio-Demographic Factors Affecting Decrease in Consumption of Chicken Meat Because of Avian Influenza (Bird Flu) in Turkey: Case of Multiple Bounded Probit Model

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Abstract: In this study, we assessed consumer response towards avian influenza (bird flu). A random sample was drawn from the target consumer population and face to face interview was conducted. The surveys were made in Tokat province of Turkey and in May, 2006. The data were analyzed using a multiple bounded probit model. According to results, age, household size, income, monthly chicken meat consumption in families, and risk variables affect decrease of chicken meat's consumption as a result of avian influenza. Dependent variable was affected negatively by age and household size variables. Conversely, dependent variable was affected positively by income, monthly chicken meat consumption in family, and risk variables.

Key words: Avian influenza, multiple bounded probit model, consumer perception, health.

INTRODUCTION

“Avian influenza is an infectious disease of birds caused by type A strains of the influenza virus [1]”. “In the first three months of 2006 alone, 23 additional countries in Europe, Asia, Africa, and the Middle East had confirmed cases among poultry, wild birds, and even domestic cats.” [2]. “There is growing concern about the possibility of an avian flu pandemic (AFP) and its implications for humans and the global economic and financial system. While such pandemics are not new—the last one occurred in 1968—health experts are particularly concerned about the current strain of the virus avian flu” [3]. “Bird flu's affected the poultry industry in the world. France's poultry sector, the biggest in Europe, is now losing 40 million euros (\$48 million), Germany's poultry industry has lost more than 140 million euros, Hungarian poultry producers sales had fallen by up to 20 percent because of bird flu” [4]. “World Bank forecast that pandemic of avian influenza among humans could cost the global economy US \$800 billion a year” [5].

“According to the Ministry of Health of Turkey, three cases of human infection with the avian influenza virus. Three of these cases were fatal. The Ministry of Health has also announced 30 patients are being treated and evaluated for possible avian influenza infection at hospitals” [6]. Panic over the transmission of the disease

has spread across Turkey. The announcement of outbreaks appears to cause the consumption of chicken to decline and the poultry industry was seriously affected after the publicity about the presence of a health risk in chicken.

Some studies were made related to potential economic impact of an avian flu. Bloom, Wit and Carangal-San Jose [7] in your study developed scenarios that the whole of emerging East Asia could lose about 2.5 percentage points of economic growth in a year under a scenario with a relatively brief impact or as much as 6.5 percentage points of economic growth in a year as a result of the disruptions caused by a large-scale pandemic-including, for example, the indirect effects on tourism. Page *et al.* [8] drew upon some of the research undertaken as part of that scenario planning exercise to illustrate how it represents a case study of best practice, both in planning for a flu pandemic and also in terms of sharing this knowledge with National Tourism Organizations and Tourism Organizations globally via the World Tourism Organization and other communication channels.

The aim of this study is to determine the factors that affect the decreasing in chicken meat consumption as a result of avian influenza in Tokat province of Turkey. Decreasing chicken meat consumption reduces chicken firms' income. One way of increasing the income is to know the consumer behavior in this area.

MATERIAL AND METHODS

The data of study was collected from consumers using face to face survey method. The value of survey was calculated according to sampling of random sample method. Firstly, Tokat province was divided into four locations for survey study. Those regions have been selected from regions which have different income distribution. The survey was conducted with 253 households in May, 2006.

Multiple bounded model is used for the analysis affecting consumers' consumption of chicken meat after outbreak avian influenza (bird flu). Multiple bounded model is used for analysis consumers' preferences in previous study such as [9,10]. Cameron and Huppert^[10] explained the methodology of multiple bounded probit model as follows:

If the respondent's true valuation, Y_i , is known to lie within the interval defined by lower and upper thresholds t_{li} and t_{ui} , then (WTP_i) will lie between $(\log t_{li})$ and $(\log t_{ui})$. It is generally presumed that $E(WTP_i|x_i)$ is some function $g(x_i, \beta)$, for which a linear-in-parameters form is computationally convenient. In the simplest case,

$$WTP_i = x_i \beta + \varepsilon_i$$

Where, x_i is a vector of explanatory variables β is the vector of corresponding coefficient ε_i and is distributed normally with mean 0 and Standard deviation σ . It can "standardized" each pair of interval thresholds for WTP and state that

$$\Pr(WTP_i \subseteq (t_{li}, t_{ui})) = \Pr((\log t_{li} - x_i \beta) / \sigma < z_i < (\log t_{ui} - x_i \beta) / \sigma)$$

Where, z_i is the standard normal random variable. The probability expressed in equation (2) can be rewritten as difference between two standard normal cumulative densities. Then for a given observation (2) can be written as,

$$\Pr(WTP_i \subseteq (t_{li}, t_{ui})) = \Phi(z_{ui}) - \Phi(z_{li})$$

The log-likelihood function is then

$$\log L = \sum_{i=1}^n \log [\Phi(z_{ui}) - \Phi(z_{li})]$$

The likelihood function was conducted using the

LIMDEP computer package^[11], running GROUPED DATA command.

Respondents were asked tree section divided questions. In first section, we asked the socio-demographic characteristics of respondents such as gender, age, education level, household size, income level. In the second section, we asked monthly chicken meat consumption in families. The answer of this question shows consumers' habit of chicken meat consumption. Monthly chicken meat consumption has been asked as kilogram. In the third section, risk question was asked to respondents about their health. Risk variable was divided five grouped. The following question was asked to risk. Are you thinking to be risky consumption of chicken meat to your health after outbreak avian influenza?

In the model, drop in consumption of chicken meat of families because of avian influenza (bird flu) was used the dependent variable.

The question was asked to respondents that how percent decrease your family's consumption of chicken meat because of avian influenza (bird flu)? In addition decreases consumption of chicken meat divided six classes. The six classes seeing how percent decrease of consumption were determined such as 0%, 1-5%, 6-10%, 11-25%, 26-50%, and 51-100% (table1).

RESULTS AND DISCUSSIONS

In table 1, dependent and independent variables were identified. According to the survey results, the average household size was found to be 3,26 people. It is lower than household size of Turkey (4,05)^[12]. The male respondents constitute 62,66 % of total respondents while female respondents constitute 37,34 % of it. Male and female proportions are 50,65% and 49,35% in Turkey, respectively^[12]. The results shows that 26,00% of households were illiterate and primary school graduates, 12,00% were secondary school graduates, 52,00% were high school graduates, 10,00% were university graduates and high. Average monthly income of households was found as 1058,74 NTL (\$791). According to results, monthly average chicken meat consumption in a family was found as 4,26 kg.

The results of the multiple bounded probit model has been given at Table 2. According to results, age, household size variable is significant at 5%, income, consumption of chicken meat, and risk variables are significant at 10%. Gender and Education variables are not significant.

Table 1: Variables definition and sample statistic

VARIABLES	MEAN	STANDARD DEVIATION
<i>Dependent variable</i>	284	1853
How percent decrease your consumption of chicken meat after outbreak avian influenza (bird flu)?		
None =1		
%1-5 =2		
%6-10 =3		
%11-25 =4		
%26-50 =5		
%51-100 =6		
Gender	620	487
Male=1		
Female=0		
Age	2287	821
17-25 =1		
26-35 =2		
35- + =3		
Education	3453	1000
Illiterate=1		
Primary school= 2		
Secondary school=3		
High school =4		
University graduates and high=5		
Household size	3260	1292
Number of person in family		
Income	2347	882
Monthly household income (NTL*)		
≤ 500 =1		
501-1000 =2		
1001-1500 =3		
1501 - + = 4		
Monthly chicken meat consumption in family	4260	2184
Quantity of consumption chicken meat in family (kilogram/monthly)		
Risk	2020	1026
No risky=1		
Low risky=2		
Risky=3		
High risky=4		
Very high risky=5		

\$1 = NTL 1,338 at 10 May 2006. ^[13].

*NTL (New Turkish Lira).

The sign of age coefficient is negative. The negative sign shows that drop in consumption of chicken meat decrease because of avian influenza while age of consumer increase.

Household size variable have negative sign. In addition, the variable is significant according to p value (5%). Consumption of chicken meat in crowded households has been affected by avian influenza more than un-crowded household. Mean of this sign is decreasing in consumption of chicken meat while

household size increases. The results can be explained that per person income is low in crowded households than un-crowded households. Therefore, crowded households consume more chicken meat in Turkey since chicken meat cheaper than red meat in Turkey^[12]. Chicken consumption has been slowly decreased since drop in prices of chicken on crowded household in Turkey.

The sign of income coefficient is positive. The positive sign shows that drop in consumption of chicken meat increase while consumers' income

Table 2: Results of the multiple bounded model

Variables	Coeff.	Std.Err.	t-ratio	P-value
Constant	14,253	22,812	0,624	0,532
Gender	3,637	6,047	0,601	0,547
Age	-9,589**	4,026	-2,381	0,017
Education	-3,362	3,151	-1,066	0,285
Household size	-4,910**	2,300	-2,134	0,032
Income	6,322***	3,532	1,789	0,073
Monthly chicken meat consumption in family	2,450***	1,407	1,740	0,081
Risk	5,137***	2,841	1,808	0,070
Sigma	31,057*	2,800	11,089	0,000

*, ** and *** indicate the significance level of 1%, 5% and 10%, respectively
 Log likelihood function: -245.118.

increases. This is an expected result because of households have high income level are more sensitive about your health than households have low income. Same relationship between health sensitive and income in the study have been founded in previous studies such as [14,15,16].

Monthly chicken meat consumption variable is represent quantity of consume chicken meat. The variable has got positive sign. Positive sign illustrate that drop in consumption of chicken meat increase after outbreak avian influenza (bird flu) while monthly chicken meat consumption of families increases.

Risk variable represent sensitive of consumers their health. The coefficient of variable is positive.

Positive coefficient demonstrate that drop in consumption of chicken meat increase after outbreak avian influenza (bird flu) while risk perception level of consumers increase. This is a natural result. Consumers who have high level risk perception are more affected than consumers who have low level risk perception.

Conclusion: The purpose of this study is to assess the effects of socio demographic and risk variable for decrease consumption of chicken meat after outbreak avian influenza in Turkey. The results suggest that age, household size, income, monthly chicken meat consumption in families, and risk variables affects consume of chicken meat after outbreak avian influenza. Age and household size variables affect positively the quantity of chicken meat's consumption after outbreak avian influenza. Income, monthly chicken meat consumption in families, and risk variables affect negative the quantity of chicken meat's consumption after outbreak avian influenza. This finds some suggestion includes to policy maker and poultry firms affected avian influenza. Bird flu damaged to poultry

sectors because fall in chicken's prices and sales in Turkey^[17]. The poultry firms should know the factors affecting consumption of chicken meat due to pass minimum damage. If poultry firms have some data deal with factors affecting chicken meat consumption of consumer, they can improve some marketing strategies. Our results suggest for poultry firms that older respondents, crowded households, families have low income level, families many consuming chicken meat, and consumers unloving a risk should have been selected as target audience.

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