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THE CASE OF AVIAN INFLUENZA IN TURKEY

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ABSTRACT: The primary concern of this paper is to inquire about the associations between socio-demographic and psychological variables related to avian influenza in Turkey. The data were collected from a survey given to a sample of 247 females and 223 males from six regions in Turkey. Statistical analysis revealed that gender, education level, and socio-economic status had significant impacts on knowledge, attitudes, and responsible behavior. Participants who were more aware of the impacts of nature made important suggestions at both the national and international level.
Key words: bird flu; risk; attitudes and behaviors; Turkey

1. Introduction

Health issues are among the most relevant environmental problems of today and include both human health and the health of ecosystems. The emergence of diseases that can jump from animals to humans, such as avian flu and mad cow disease, has been treated as a natural disaster by public health officials, veterinarians, government officials, and the media (Nierenberg 2005).

Avian influenza, or 'bird flu', is a viral disease that normally infects birds (WHO 2008). According to the UNEP Deputy Executive Director (UNEP 2008), the rise of avian influenza as a challenge to human health is clearly a reflection of major changes taking place in the environment. Avian influenza is not the only disease with an environmental health background. A common factor is the evolution of these diseases when humans comprehensively interact with the natural environment.

The greatest concern is that the virus could mutate into a highly infectious form easily transmitted from person to person, potentially starting a global outbreak. The risk of pandemic avian influenza persists and is serious (Mills *et al.* 2006; Perris *et al.* 2007; Poland *et al.* 2007).

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Different types of global and local environmental risks or disasters, including global warming, the expansion of the ozone hole, desertification, droughts, earthquakes, floods, fire, tsunamis, AIDS, and, recently, the global outbreak of avian influenza (popularly known as bird flu), have become more serious threats at various levels, including home health care as discussed by Gershan *et al.* (2007). However, one should also notice that because of food technology in general, genetically modified (GM) foods specifically, and problems in food security, human-made risks are becoming important as well (Anderson and Cook 1998; Dilley and Boudreau 2001; Kwon *et al.* 2004; Vasgues *et al.* 2007). With the growing awareness of and anxiety about global risks triggered by modern ecological problems, Luhmann (1993), as one of the pioneers of risk and anxiety conceptualization, focuses on two very important issues in contemporary societies: 'trust' and 'uncertainties', which are different faces of the same coin. Actually, this is also true and valid in the case of avian influenza, which consists of both health and environmental characteristics. In other words, avian influenza has two dimensions; one is the human aspect and the other is the environment.

Moreover, various issues relating to avian influenza have been studied by experts; for example, the epidemiology and human aspects of avian influenza, avian influenza and wild birds, early warning systems, and the development of risk assessment models. Vincent Martin (2006) from the UN Food and Agriculture Organization (FAO) focuses on the role of poultry production systems in the spread of H5N1 and cultural and trade practices that influence the emergence of highly pathogenic avian influenza (HPAI). Martin explains that the emergence of HPAI in Asia resulted from the convergence of different risk factors, such as the increasing intensity of poultry production systems, low biosecurity, and the absence of effective veterinary services.

David J. Rapport (2006), the president of the International Society for Ecosystem Health, highlights the issue of avian influenza and the environment from the eco-health perspective. This approach has to become a major part of the strategy to limit the spread of H5N1. For Rapport, an ecosystem health approach would call for reducing high concentrations of poultry production, particularly in areas close to high concentrations of humans; restoring the health of natural wetlands; and minimizing domestic poultry production in major wild bird flyway zones. Restoring the ecological balance entails changing human behavior as well as altering ecosystems.

According to the existing literature on environmental studies, there are many commonly held views and beliefs regarding how human behavior is considered the cause of environmental problems, which are generally referred to as 'human-made disasters' (Giddens 1998). Among others,

individual choices, consumption, sacrifice, values and attitudes, education, motivation, incentives, and emulation are the most studied variables (Stern 2000). It is also assumed that a major opportunity for contribution lies in examining the interactions among those variables that shape environment-related behavior (Gardner and Stern 1996).

In this study, the researchers assumed that the nature/society continuum would provide an appropriate theoretical standpoint because the study deals with poultry as a part of nature and people as a part of culture.

1.1. Avian influenza

A form of influenza virus causes bird flu and usually infects only birds, though sometimes it also infects pigs. A recent variety of bird flu that has infected people, first in Asia and then spread all over the world, is the H5N1 strain. It is well known that H5N1 cannot efficiently spread from person to person and remains primarily an animal disease (Swayne and Halvorson 2003; Perdue and Swayne 2005). The important question is why people are so worried. The answer is that there exists a high probability that the H5N1 strain of bird flu could mutate into a new form that is passed or spread from person to person, which would result in millions of deaths.

During the last century, there were three flu pandemics. The worst occurred from 1918 to 1919 and almost 50 million people died worldwide from Spanish influenza. The second pandemic started in Hong Kong in 1957 and death toll reached nearly two million by the time it ended in 1958. The third pandemic again occurred in Asia, specifically South-eastern China, and killed about one million people.

The first cases of avian influenza in Turkey were seen in October 2005 at Manyas Lake, which is a migrant bird habitat in the Marmara Region. After the outbreak, the region was quarantined and nearly 10,000 winged animals were killed by local agents of the Ministry of Agriculture. In December 2005 and January 2006, other cases of avian influenza were seen in Turkey, especially in the eastern parts, and four people from this region died because of H5N1 (FAO 2007). After this case was made public by the Ministry of Agriculture and Ministry of Health, there was a large panic among the people and a sharp drop in poultry consumption in Turkey. With the help of the media, almost every part of Turkey was affected by these cases.

Precautions taken by the government against avian influenza are as follows: during the initial outbreak of disease, regions were quarantined, winged animals were killed, and transportation of animals was forbidden

for a while; the state imported medicine; and for the long term, the state prepared informative programs for public education to increase awareness of H5N1. Three years after the outbreak, January and February 2008 saw more dead birds because of this virus, but there have been no human deaths yet.

According to the Food and Agriculture Organization of the United Nations (FAO), the calculation of wild winged animals (including birds and chickens) is not an easy job anywhere. In fact, there were approximately 18–20 billion wild chickens in Turkish villages by the end of 2005 when the first bird flu case was reported, though some international sources, such as the European Union and Brussels, do not agree with this figure. According to international estimations, the real number was higher, approximately 40–60 billion. Because there are 40,000 villages in Turkey, this figure would place 1000–1500 chickens in each village, which is normal (FAO 2007).

There are contradicting stories about this culling, and it is believed that wild poultry production was destroyed for the sake of the integrated production system. This policy has been criticized by several stakeholders in the media. In the beginning, magazines and television programs were full of both negative and positive reactions over the measures, but they are now all forgotten or have been filed away as other extraordinary conditions. Because chickens and eggs are the main source of protein for rural and urban poor populations, this intervention has had many negative impacts on the disadvantaged poor. The impact of the outbreak on the economy was also controversial. In free market conditions, an economy mostly works for the sake of big capitalist enterprises and, therefore, the overall economic impacts seemed positive at the market level, but at the individual family level it was clearly negative (Altinöz and Börütecene 2008).

In a globalized world system similar to others, Turkey also functions or serves according to the rules of a capitalist and global economic system. Therefore, the government only announced their strict measures without taking into consideration the poor people and their basic needs. One can also imagine that if the real numbers are higher than declared, the government may have two messages: one is for the public, 'I care about you'; the second is for the international community, 'I have already taken all measures to secure the world's health and safety and killed almost all wild winged animals in Turkey'. Yet, it is not known what or who was right.

Despite warnings from health authorities and scientists, the governments of developed countries could not respond immediately, mainly because of bureaucratic and diplomatic reasons. As a result, avian

influenza has mostly affected poor Asian countries where flocks are the major source of protein, which is also the case for Turkey.

There are similarities among Turkey and the countries of Southern Asia. The spreading of the H5N1 virus mostly occurred in small villages where poultry, especially domestic ducks, are raised in open-air fields with exposure to wild migratory birds and marketed in open bazaars or markets. Since the world's poorest people are at risk from this deadly virus, those who suffer from starvation and hunger in Africa and Asia will certainly be more affected by it. For a sustainable environment, the natural, economic, and social costs of the disease have to be taken into consideration.

The recent outbreaks of avian influenza, which involved the intermixing of the natural (birds, poultry, and disease) and the social (national and international community), provide an important potential base for a theoretical stand point concerning empirical environmental studies. Furthermore, psychological and psycho-social variables, such as locus of control and fatalism, which are the main variables for environmental studies (Karanci and Aksit 1999; Kasapoglu and Ecevit 2003), may change from culture to culture. Therefore, a nature/culture combination can also be considered as an appropriate conceptualization for any empirical study on environment, such as this one in Turkey.

As discussed by Berenguer *et al.* (2005), despite numerous environmental studies, there exist two basic lines of research; one group has focused on the socio-demographic factors (e.g., gender, age, educational level) associated with environmental issues and another has concentrated more on the psychological factors (e.g., attitudes and behaviors).

Avian influenza continues to be on the daily agenda of Turkey, which is on the bird migration pathway. Awareness of the population regarding avian flu and preventative measures to be taken against the spread of the disease is important.

The aim of the present study is to investigate the knowledge and attitudes of the Turkish people about this disease and preventative measures. Our primary intention was to test the relationship between socio-demographic factors and knowledge of, attitudes towards, responsible behavior regarding the risk of, and preventative measures for avian influenza.

The second intention was to determine what suggestions are offered to solve the problems at the national and international level.

2. Subjects and methods

The data were collected in February 2006 after health authorities around the world warned that humanity could face the first global influenza

pandemic and the virus had been confirmed in Turkey. In this study, a two-staged cluster sample was used; in the first stage, regions were selected, followed by provinces. The sample for this research was drawn from six different regions in Turkey: Central Anatolia, Akdeniz, Marmara, Aegean, and Eastern and Southeastern Anatolia. These regions were purposefully selected from the country's seven regions in order to take into account differences in regional development. Questionnaires were distributed to participants living in 21 provinces: Ankara, Istanbul, Bursa, Kocaeli, Yalova, Eskisehir, Adana, Antalya, Mersin, Gaziantep, Bingöl, Kars, Erzurum, Siva, Sanli Urfa, Elazig, Hakkari, Hatay, Batman, and Sirnak. A total of 488 participants responded from five regions of Turkey, 247 (56.6%) females and 223 (45.7%) males, which is a total response rate of 97.6%. The average schooling of the participants was 10.31 plus or minus a standard deviation (SD) of 4.17 years and the mean age $\pm$ SD was 33.28 ± 11.8 years.

Participants voluntarily responded to the questionnaires based on the directions provided. Researchers informed participants about the objectives of the study and they were assured that their answers would remain confidential. It should also be noted that, since participation was voluntary and random selection was not possible, the population of this study covers only the participants and results cannot be generalized.

Two phases were undertaken in this empirical study; a pilot study followed by the main survey. The pilot study was carried out with the students and their parents from Faculty of Letters, who come from different regions of Turkey. It was assumed that the students would represent the sample population. The pilot study helped to refine the methods for measuring participant attitudes and behaviors using a five-page questionnaire. Responsible behavior was the most important dependent variable (Hines *et al.* 1986; Kasapoglu and Ecevit 2002) and the following statements were used to measure it based on the question, 'Which of the following have you done so far, and how frequently?: "I avoided eating certain foods (like chicken and eggs)"; "I warned others not to eat winged animal products"; "I was vaccinated"; "I was careful about personal hygiene"; "I acquired drugs for curing the disease"; "I carefully searched for symptoms of the disease on myself and others"'. Higher scores were given for a higher frequency of responsible behavior and lower scores for more irresponsible behavior (Hines *et al.* 1986). Therefore, questions about the participants' behaviors were designed as three-point Likert-type scales, and 'always' was scored three points, 'sometimes' two points; and 'never' one point.

Whether participants expected things from a powerful other, which is termed internal locus of control, was an important psychological variable in this study (Kasapoglu and Ecevit 2003) that was measured by a single

statement, 'the state should bear the greatest responsibility for the problem', on a three-point Likert scale; 'completely agree' was scored as one point, 'moderately agree' two points, and 'not agree' three points. Since a negative correlation has been reported between fatalism and responsible behavior (Karanci and Aksit 1999; Kasapoglu and Ecevit 2003), fatalistic attitude was taken as another psychological variable in this study. The statement 'what is happening is divine providence and we cannot do anything about it' was used to measure this attitude on a three-point Likert-type scale; each 'completely agree' was scored three points, 'moderately agree' two points, and 'not agree' one point. The question 'how does avian influenza mainly spread?' was used to measure the knowledge variable. Potential answers were classified as scientific or true definitions, which included 'by contact with sick or dead winged animals or eating them'; false or wrong definitions, which included 'by contact with people suffering from the disease' and 'by consuming winged animal products'; and other answers to be specified. For regression and correlation analyses, the scientific answer was accepted as a valid answer and scored as one point. The rest were considered as invalid and scored as zero.

In order to measure prevention at the national level, the following statements were used: (1) strict prohibitions rather than warnings should be introduced (i.e., prohibition of personal poultry farming, marketing, and transportation); (2) a quarantine should be implemented; (3) the government should pay more attention to public health measures rather than the economy; (4) scientific studies and research should be increased; (5) we should benefit from global experiences; (6) people should receive better education; (7) the quantity of specialized personnel should be increased; (8) in the short run, the common interests of the country, rather than those of the specific sectors (i.e., modern large-scale poultry producers), should be taken into consideration; (9) effective communication should be provided among related state organizations, such as the ministries of Environment, Health and Agriculture; (10) the economic wealth of society should be improved; (11) health issues, as a human right, should be guaranteed by the State; (12) international assistance should be requested (i.e., WHO); (13) responsible government officers who did not fulfill their duties should be fired or punished; (14) the losses of sufferers' should be compensated; (15) domestic poultry production should be prohibited; (16) migration from rural areas to more urbanized dwellings should be encouraged; (17) more effective prevention measures should be provided for less developed regions of Turkey; and (18) other answers to be specified. Respondents marked their answers on a three-point Likert scale; 'completely agree' was scored three points, 'moderately agree' two points, and 'not agree' one point. Later in the questionnaire, respondents

were asked, 'according to you, which of the above solutions is the most effective?', and were told to specify by writing the number of the solution.

For policy suggestions at the international level, the following statements were used: (1) all nations/countries should make contributions to the scientific investigation of this disease; (2) developed countries should contribute by supplying medication; (3) the harm of a pandemic on the global economy should be calculated and precautions must be taken; (4) international funds should be raised in order to compensate for economic losses; (5) all countries should coordinate their efforts in order to develop sustainable environmental policies; (6) information about the dissemination of a pandemic should be shared; (7) international standards should be determined for poultry and winged animal production; and (8) other answers to be specified. Respondents again were asked to mark their answers on a three-point Likert-type scale; 'completely agree' was scored three points, 'moderately agree' two points, and 'not agree' one point. Later in the questionnaire, respondents were asked the question, 'according to you, which of the above solutions is the most important?', and told to specify by writing the number of the solution.

Questions about the demographic characteristics of participants, such as sex, educational level, and geographic regions, were designed as forced-choice questions. Their socio-economic status was measured by their income level by respondents rating their income on a three-point Likert scale ('low income' was scored one point, 'moderate income' two points, 'high income' was scored three points) according to their perception of their economic status. In this study, linear regression analysis was performed to analyze the factors contributing to the defined psychological variables of knowledge, locus of control, fatalistic attitude, and responsible behavior. We were interested in looking at the possible relationships among participants' demographic characteristics and psychological variables in relation to avian influenza. For data analysis, the Statistical Package Program for Social Sciences (SPSS) was used. The findings are presented on the basis of parametric, including regression analysis and correlation coefficients, and a non-parametric statistical test (chi-square, χ^2) based on cross tabulations.

3. Results

Parametric (regression) and non-parametric (chi-square) statistical analysis revealed that educational level of participants as an independent variable had an effect on the knowledge variable, and as the educational level of participants increased, the number of scientific/true answers given for how avian influenza spreads increased ($\chi^2 = 52.448$; df = 8; $P < 0.001$).

The same observation was made for the SES variable; as the SES of participants increased, their scientific answers increased as well ($\chi^2 = 35.092$; df = 3; $P < 0.001$). It should be also noted that during the presentation of data only parametric analysis results are given in tables (see Table 1).

For the locus of control variable, analysis revealed that women's internal locus of control was lower than that of men's ($\chi^2 = 19.862$; df = 2; $P < 0.001$) and women's expectations of the State (45%) were higher than those of men (38.2%). In other words, the number of 'completely agree' responses to the statement, 'the state should bear the greatest responsibility for the problems', was higher among women. Also, although the results of the non-parametric analysis was not significant ($\chi^2 = 3.263$; df = 3; $P > 0.353$), the percentage of scientific answers were higher among young participants aged 15–24 years (91.9%) and lower among the older 45+ years age group (84.4%).

Concerning fatalism, as the educational level of participants increased, their fatalistic attitudes decreased in a manner similar to the knowledge variable ($\chi^2 = 82.518$; df = 16; $P < 0.001$). The percentage of 'completely agree' responses to the statement, 'what is happening is divine providence and we can not do anything about it', was higher among illiterate participants (40%) and lowest among university graduates (4%). In addition, fatalism was lower among participants with higher income (1%) and high among participants with a lower income (25.8%) ($\chi^2 = 29.708$; df = 6; $P < 0.001$).

In order to draw a more comprehensive picture about responsible behavior, researchers asked more than one question to assess participants' responses (see Table 2). The questions revealed that the participants' behavior was highly responsive to all alternatives except vaccination. However, this vaccination was for general prevention and not specific to bird flu. In general, going to the hospital and asking for a vaccination can be interpreted as a sign of being more sensitive especially when its time consuming aspect and economic cost (price) are taken into consideration. In Turkey, as a developing country, the health infrastructure is not well organized and seeking help from the hospital requires extra time and energy from individuals, even when they are covered by insurance. Therefore, we assessed this variable as being selective and used it to measure responsible behavior when calculating the parametric and non-parametric statistics. Although we did not find a significant relationship between gender and responsible behavior ($\chi^2 = 7.306$; df = 3; $P > 0.063$), the percentage of vaccinated women (88.3%) was higher than that of men (83%). We also found that there was a negative relationship between education and responsible behavior ($\chi^2 = 59.083$; df = 24; $P < 0.001$); as the level of education increased, answers corresponding to responsible

TABLE 1. Results of the regression analysis of the effect of demographic factors on four dependent variables ($N = 488$)

Independent variables	*Knowledge*	*Locus of control*	*Fatalist attitude*	*Responsible behaviors*
Gender (female = 1)	−0.014 (−0.022)	−0.282 (−0.168)***	0.085 (0.057)	0.184 (0.129)***
Age (years)	0.001 (0.035)	−0.012 (−0.174)***	0.053 (0.078)	0.003 (0.047)
Education (years)	0.019 (0.241)***	0.008 (0.040)	−0.033 (−0.182)***	0.023 (0.136)**
Region (Eastern/undeveloped = 1)	−0.0003 (−0.004)	0.059 (0.028)	−0.125 (−0.066)	0.064 (0.036)
SES[1] (perceived)	0.070 (0.158)***	0.054 (0.048)	−0.138 (−0.134)**	−0.012 (−0.012)
R^2	0.116	0.061	0.096	0.017
F	11.191***	5.515***	9.302***	2.494**

Unstandardized B is presented with standardized coefficient β in parentheses.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed test).
[1]Socioeconomic status.

TABLE 2. Distribution of answers regarding responsible behavior ($N = 488$)

Behavior	*Always*	*Sometimes*	*Never*	*Total*
Avoided eating chicken and eggs	51.0	35.5	13.5	100
Warned others not to eat winged animals	52.3	30.9	16.8	100
Was vaccinated	8.0	7.2	84.8	100
Careful about personal hygiene	69.7	18.9	11.5	100
Acquired drugs for curing disease	11.5	12.5	76.0	100
Searched for symptoms	42.4	24.2	33.4	100

Values indicate the percent of respondents who chose that response.

behavior decreased. For example, the percentage of 'never' responses was lower among illiterates (76%) than among university graduates (91.9%).

The correlation coefficients among psychological variables are given in the Table 3. The results show that there were positive correlations between internal locus of control and knowledge, knowledge and responsible behavior, and internal locus of control and responsible behavior. However, there were negative correlations between knowledge and fatalist attitude, internal locus of control and fatalist attitude, and fatalist attitude and responsible behavior.

At the national level, the top three ranked suggestions were 'people should receive better education' (11.9%), 'the government should pay more attention to public health measurements rather than to the economy' (10.7%), and 'scientific studies and research should be increased' (10.2%) (Table 4). It is evident that the profit aims of big companies always come first and gain importance in extra ordinary conditions. For example, in Turkey, big poultry companies were organizing campaigns to increase poultry consumption, whereas small farmers have faced livestock extermination with little or no compensation due to rash and insufficient quarantine measures imposed by health authorities. The lack of trained staff and necessary equipment also affected Turkish farmers and their stock in a negative way, but this was rated by only 1.6% of participants in the first instance. In addition, age and education had significant impacts

TABLE 3. Zero order correlations for psychological variables

Variables	*Knowledge*	*Internal locus of control*	*Fatalist attitude*
Knowledge	–		
Internal locus of control	0.092*	–	
Fatalist attitude	−0.275***	−0.230***	–
Responsible behavior	0.090*	0.098*	−0.128***

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed).

TABLE 4. Impact of independent variables on the first three policy suggestions at the national level

Independent variables	*1. Better public education (11.9%)*	*2. Public health priority (10.7%)*	*3. Scientific research (10.2%)*
Gender (female = 1)	0.030 (0.029)	−0.009 (−0.007)	0.051 (0.043)
Age (years)	000 (0.009)	−0.006 (−0.115)**	−0.005 (−0.106)*
Education (years)	−0.008 (−0.068)	−0.030 (−0.195)***	−0.028 (−0.200)***
Regions (undeveloped = 1)	−0.034 (−0.026)	−0.088 (−0.054)	0.023 (0.016)
SES[1]	−0.001 (−0.001)	0.021 (0.024)	0.080 (0.100)
R^2	0.007	0.037	0.036
F	0.622	3.346***	3.298***

Unstandardized B is presented with standardized coefficient β in parentheses.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed).
[1] Socioeconomic status.

on the second (priority of public health) and third (scientific research) rated policy suggestions. Although the correlation was not significant ($\chi^2 = 7.493$; df = 9; $P > 0.586$), as age increased, the number of 'completely agree' responses for giving priority to public health issues was slightly decreased. There was a significant relationship between education and the priority of public health issues ($\chi^2 = 64.009$; df = 24; $P < 0.001$); the percentage of 'completely agree' responses was higher among university graduates (87.9%) and lower among illiterate participants (40%). We identified no significant relationship between age and scientific research ($\chi^2 = 13.653$; df = 9; $P > 0.136$). However, we did observe a significant relationship between education and scientific research ($\chi^2 = 57.263$; df = 24; $P < 0.001$); as the educational level increased, the number of 'completely agree' responses also increased. Specifically, the percentage of 'completely agree' responses was lower among illiterate participants (52%) and higher among university graduates (87.9%).

For international policy suggestions (Table 5), the first three were ranked as follows: 'international standards should be determined for poultry and winged animal production' (21.9%), 'all nations should make contributions to the scientific investigation of the disease' (19.3%), and 'all countries should coordinate their efforts among themselves in order to develop sustainable environmental policies' (11.7%). There was a significant relationship between education and contributions to scientific research ($\chi^2 = 60.521$; df = 24; $P < 0.001$). The percentage of 'completely agree' responses was lower among illiterate participants (64%) than university graduates (83.8%).

TABLE 5. Impact of independent variables on the first three policy suggestions at the international level

Independent variables	*1. International standards (21.9%)*	*2. Scientific research contributions (19.3%)*	*3. Sustainable development (11.7%)*
Gender (female = 1)	0.048 (0.039)	0.000 (0.000)	−0.044 (−0.033)
Age (years)	0.001 (0.022)	−0.001 (−0.013)	−0.002 (−0.035)
Education (years)	−0.011 (−0.077)	0.026 (0.150)***	0.007 (0.041)
Regions (undeveloped = 1)	0.028 (0.018)	−0.167 (−0.092)	−0.153 (−0.091)
SES[1]	0.098 (0.118)	0.062 (0.063)	0.061 (0.068)
R^2	0.014	0.048	0.022
F	1.204	4.418***	1.955

Unstandardized B is presented with standardized coefficient β in parentheses.
*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$ (two-tailed).
[1]Socioeconomic status.

4. Discussion

In light of the regression analysis, we argue that, except the variable of region, socio-demographic factors have significant effects on psychological variables at varying degrees as independent variables. In Turkey, due to economic necessity, people live side by side with poultry, providing a suitable breeding ground for a highly transmissible virus. Therefore, health authorities decided to stop domestic poultry production, particularly in Eastern Anatolia where the poorest people live. Thus, we included region as a variable in the regression analysis by scoring Eastern Anatolia as one and the other regions as zero. For the locus of control variable and expectations of the State, the difference we observed between men and women were in accordance with former studies carried out in Turkey (Karanci *et al.* 1999).

It could be argued that the more educated participants did not believe in the positive effects of vaccination because there was no effective medicine available, and more educated people would be aware of this reality. On the other hand, highly educated professionals might neglect their health because of heavy bureaucratic working conditions and responsibilities. The findings of this study are in accordance with the former literature, which indicates that lay workers use more health services than their educated employers (Netteleton 1995).

The relationships observed among the psychological variables were in the expected direction and could be interpreted as follows: fatalists who believe that God knows everything, may expect everything from God or from powerful others, such as the State, instead of taking individual responsibility. The findings of this study also support previous studies

conducted in Turkey (Karanci *et al.* 1999). Also, it would not be wrong to indicate that the links between fatalistic attitude and other variables were highly significant, though in the negative direction.

It was found that some suggestions might be implemented or used for better risk management with respect to H5N1 in Turkey. Participants suggested that people should have better education to cope with this risk, the government should pay more attention to public health, and scientific studies and research should be increased substantially. These recommendations show that people prefer a long-term strategic action plan rather than fixing the problem by a traditional approach, such as quarantine when there is evidence of poultry infection with H5N1.

It is clear that modern poultry production is more efficient and protective than traditional agricultural systems in which birds are raised outside in small flocks. The World Health Organization (WHO) is monitoring the regions where there have been outbreaks in order to observe whether the virus spread or mutated. In addition, the WHO prepares emergency plans to overcome the threats of a pandemic, stockpiling antiviral drugs (Tamiflu) and medications to help people if they do become infected. Meanwhile, scientists from all over the world are working on a vaccine to prevent people from contracting avian influenza. In order to prevent bird flu from spreading, national governments that have experienced outbreaks have killed more than 150 million birds. Japan, Korea, Malaysia, and Turkey have controlled their outbreaks and reported that the virus is no longer in their countries.

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