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Original Article

# Zoonoses awareness and health perception in livestock farmers: Example of a city in Western Türkiye

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## Abstract

**Background:** Zoonotic diseases are on the increase globally. Relevant disease awareness practices regarding public knowledge are useful for disease control. This study aimed to evaluate the relationship between individuals' perception of health and awareness of zoonotic diseases.

**Methods:** A cross-sectional study was conducted among farmers in the villages of Kutahya province, located in the west of Türkiye, between February and March 2022. A questionnaire involving questions about the sociodemographic characteristics of the participants in the first part and information about the transmission route of zoonotic diseases and the Health Perception Scale (HPS) in the second part was used in this study. Mann Whitney U and Kruskal Wallis-H Test was performed to compare group medians. P<0.05 was considered statistically significant.

**Results:** The mean age of the participants was 44.10±10.73. The mean score of the individuals obtained from the HPS was 46.62±4.58. The health perception of the participants was found to be moderate. There was a negative correlation between the control center and precision sub-dimensions and age (respectively r: -0.260, p<0.001; r: -0.320, p<0.001). A positive correlation was found between the importance of health and self-awareness and age (respectively r:0.248, p<0.001; r:0.279, p<0.001). Those who knew that zoonoses could be transmitted from sheep, cattle, and humans had higher HPS scores than those who did not know (respectively p:0.003; p:0.001; p:0.007).

**Conclusion:** Increasing health perception in livestock farmers may effectively prevent zoonotic diseases.

**Keywords:** Zoonotic Diseases, Zoonosis, Awareness, Level of Knowledge, Health Perception, Türkiye

## Background

Infections that can be transmitted from animals to humans or from humans to animals under natural conditions are defined as zoonoses. Since zoonoses can cause disease in humans and animals, these diseases' effects and management policies interest both areas [1]. It is reported that approximately 60% of human diseases and 75% of infectious diseases are due to zoonotic pathogens [2]. Zoonoses can be transmitted directly through the intestinal tract, by biting, inhaled route, skin contact, or indirectly by contact with contaminated clothing, animal barns, and other environmental surfaces [3]. Zoonotic diseases are on the increase globally. Countries must identify zoonotic diseases according to their geographical locations and economic development levels to develop prevention and control strategies [4,5]. Close contact with animals is crucial for transmission. Livestock farmers, especially in low-middle-income countries, are at high risk because they are often in environments contaminated with animal feces or by-products [4]. The intensity and type of contact patterns between farm animals and humans affect disease transmission. Therefore, it is a priority to identify risk factors, evaluate livestock farmers' behaviors and understand their health perceptions. Because the level of knowledge and awareness about the concepts of illness is one factor that determines the perception of health in the person, farmers must know about the transmission, prevention, and control measures of zoonotic diseases [6-8]. After all, health perception can be a factor that directs the individual to receive health care services. Zoonoses are a large group of diseases. In the research, awareness, and knowledge levels were discussed separately according to the diseases. In these studies, it was found that the knowledge and awareness levels were not sufficient [9-13]. Relevant disease awareness practices regarding public knowledge can help control the disease. Increasing awareness will help prevent and control zoonotic diseases as occupational hazards and reduce the incidence of zoonotic diseases in human and animal populations [6]. People need to have a high perception of health to increase and

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maintain awareness. After all, it is known that people's positive perception of their health status positively affects their beliefs about controlling their future health status and their lifestyle behaviors [14-16]. This study aimed to evaluate livestock farmers' awareness and health perceptions about zoonoses transmitted from animals to humans.

## Methods

### Study design and area

This cross-sectional study was conducted with farmers in the villages of Kutahya province, located in the west of Türkiye, between February and March 2022. Agricultural activities are carried out in 34.0% of the forest land covering 47.7% of the area of Kutahya province, which has a population of 578640 in general, and 121908 (21.0%) of this population live in villages/towns. The province has 13 districts and 546 villages, with 23287 registered farmers dealing with agriculture and animal husbandry [17].

### Study population and sample size

The sample size was calculated as at least 221considering that the confidence level (90.0%), response rate (50.0%), the margin of error (5.5%), and the design effect (1). A random sample was drawn using a two-stage stratified sampling methodology. In the first stage, the rural area of Kutahya was divided into 13 district strata. A total of 16 villages were selected by random sampling method. Four villages from the central district and one village from the other thirteen districts were selected. In the second stage, the interviewers made a list of the farmers in the selected villages, and 17 individuals were taken from each cluster.

### Inclusion and exclusion criteria

Participation in the study was voluntary, so those who did not want to answer the questionnaire were excluded. Those over the age of 18 and those who had the mental ability to answer the questionnaire were included in the study. Interviews were conducted on face-to-face basis.

### Data collection forms

The first part of the questionnaire involved questions about the participants' sociodemographic characteristics. In contrast, the second part involved questions about information about the transmission route of zoonotic diseases and the Health Perception Scale. The demographic information form included questions such as age, gender, number of people living in the

house, education level, monthly income, and animal species.
In the second part of the questionnaire, participants were asked whether they were ovine -to-human transmission, bovine -to-human transmission, Human-to-human transmission, the barn environment -to-human transmission, Livestock milk -to-human transmission, Livestock meat -to-human transmission. The questions were answered either “Yes” or “No". Ovine were taken as sheep and goats. The bovine was taken as cattle, water buffalo, horse, donkey, and mule.

### Health Perception Scale (HPS)

The Likert-type scale developed by Diamond et al. [18], the scale had 15 items and four sub-factors titled "Control center", "Self-awareness", "Precision," and "Importance of health". Each item in the scale was answered as "Strongly agree (5)", "Agree (4)", "Undecided (3)", "Disagree (2)", and "Strongly disagree (1)" [18]. Negative statements in the scale were scored reversely, with a minimum score of 15 and the maximum score of 75. The Turkish validity and reliability of the scale were performed by Kadıoğlu and Yıldız [19]. The Cronbach's alpha value of the scale was 0.70, with the following values for the subgroups: Control center 0.90; Self-awareness 0.91; Precision 0.91; Importance of health 0.82 [19].

### Statistical analysis

Data were evaluated with SPSS 21 program (SPSS Inc., Chicago, Il, USA). Mean, standard deviation (SD), median, minimum, and maximum values were provided for measurement data. Since data were not normally distributed, Mann Whitney U and Kruskal Wallis-H Test was performed to compare group medians. Spearman's correlation analysis evaluated the relationship between age and HPS score. $P<0.05$ was considered statistically significant.

## Results

### Sociodemographic characteristics and HPS score

Most of the participants (198 (87.2%) of whom were male, and the mean age was 44.10±10.73 (min:25-max:70). While 68.7% of the farmers were bovine breeders, 87.7% reported that the animal farm belonged to them. In comparing the participants' HPS scores according to some sociodemographic characteristics, it was determined that the HPS score was higher and statistically significant in the group under 40, those with high school or higher education, and those with a higher income than their expenses. The sociodemographic characteristics and HPS score evaluation of the participants are presented in Table 1.

### HPS score and age

The mean score of the individuals obtained from the HPS was 46.62±4.58 (min:36-max:70). Spearman's correlation analysis results observed between HPS and sub-factor score distributions and age are presented in Table 2. Accordingly, a negative correlation was determined between the control center and precision sub-dimensions and age. As age increased, control center and precision sub-dimension scores decreased. A positive correlation was found between the importance of health and self-awareness sub-dimensions and age. As the age increased, the importance of health and self-awareness sub-dimension scores also increased.

### HPS scores and transmission routes of zoonotic diseases from animals to humans

About 61.7% (n:140) of the participants reported that the disease could be transmitted ovine -to-human transmission. 64.8% (n:147) of the participants reported that the disease could be transmitted from the bovine -to-human transmission. While 74.1% (n:168) of the participants reported that diseases could be transmitted to humans by consuming the milk of sick animals, 61.2% (n:139) attributed it to consuming meat. While 57.8% (n:131) of the farmers reported that transmission could be between people, 38.3% (n:87) said that it could be from the barn environment and its surroundings (Table 3).

**Table 1.** Evaluation of the participants' sociodemographic characteristics and Health Perception Scale (HPS) scores (n=227)

| Variables | Category | | Scores of HPS | | p-value |
|---|---|---|---|---|---|
| | | n (%) | Mean ± SD | Median (Min-Max) | |
| Age | ≤ 40 | 87 (38.3) | 47.21±4.61 | 47 (39-70) | **0.036*** |
| | >40 | 140 (61.7) | 46.26±4.53 | 45(36-63) | |
| Gender | Female | 29 (12.8) | 46.45±4.95 | 46(36-61) | 0.785* |
| | Male | 198 (87.2) | 46.65±4.53 | 46(39-70) | |
| Educational level | Primary school | 79 (34.8) | 45.57±4.50 | 45(36-61) | **0.001**** |
| | Secondary school | 52 (22.9) | 45.98±3.52 | 46(39-59) | |
| | High school | 96 (42.3) | 47.83±4.89 | 47(39-70) | |
| Income | Income less than expenses | 84 (37.0) | 45.20±4.46 | 44(36-63) | **0.001**** |
| | Income equals expense | 121 (53.3) | 46.98±3.95 | 47(39-70) | |
| | Income more than the expenses | 22 (9.7) | 50.05±6.04 | 50.5(39-61) | |
| Marital status | Single / widow/ divorced | 36 (15.9) | 46.44±5.64 | 46(36-61) | 0.605* |
| | Married | 191 (84.1) | 46.65±4.36 | 46(39-70) | |
| Family type | Alone | 28 (12.3) | 47.68±5.83 | 48(36-61) | 0.295** |
| | Nuclear family | 187 (82.4) | 46.49±4.36 | 46(39-70) | |
| | Extended family | 12 (5.3) | 46.17±4.74 | 46(39-59) | |
| Animal type | Bovine | 156 (68.7) | 46.38±4.45 | 46(39-70) | 0.285* |
| | Ovine | 71 (31.3) | 47.15±4.84 | 46(36-61) | |
| Working status on the farm | Own working place | 199 (87.7) | 46.35±4.26 | 46(36-63) | 0.050* |
| | Employee | 28 (12.3) | 48.37±5.16 | 47.5(41-70) | |

*Mann Whitney U Test; **Kruskal Wallis-H Test

In comparing the participant's knowledge of the transmission routes of zoonotic diseases from animals to humans and their HPS scores, it was determined that the HPS score was higher and statistically significant in the group that said it could be transmitted from ovine-bovine/humans to humans. The results are presented in Table 3.

## Discussion

To the researchers' knowledge, this is the first study to examine the relationship between zoonosis awareness and health perception among livestock farmers in Türkiye. In our study, the HPS score was higher in the group under 40 years of age, in those with a higher education level, and in those with a higher income is in line with the literature [16]. However, as the age increased, the perception of "control center" and "precision" decreased, while the sub-dimension scores of "self-awareness" and "the importance of health" increased in our study. Accordingly, as age increased, the control of determining one's self-confidence in being healthy and able to change health decreased; he could not concentrate his control center on himself and attributed being healthy to factors other than himself [18,19]. Similarly, in our study, the "precision" sub-dimension score for determining whether an individual knows what to do to be healthier decreased with increasing age [18,19].

**Table 2.** The correlation values observed between the score distributions of Health Perception Scale (HPS) sub-dimensions and age (n=227)

| Sub-factors of PHS | Scores of HPS | | Age | |
|---|---|---|---|---|
| | Mean ± SD | Median (Min-Max) | r | p |
| Control centre | 14.48±4.16 | 14(8-23) | -0.260 | <0.001 |
| Precision | 12.47±2.92 | 12(4-20) | -0.320 | <0.001 |
| Importance of health | 10.26±3.11 | 11(4-15) | 0.248 | <0.001 |
| Self-awareness | 9.42±2.38 | 9(5-15) | 0.279 | <0.001 |
| Total | 46.62±4.58 | 46(36-70) | -0.199 | 0.003 |

Factors such as sociodemographic characteristics, economic status, environmental factors, educational status, and occupation may affect the perception of health [14,16,20]. Of these, age, income status, and education are particularly seen as crucial variables. As age increases, the perception of health worsens [20]. In our study, the HPS score was higher in the group under 40 years of age, in those with a higher education level, and in those with a higher income is in line with the literature [20]. In our study, as the age increased, the perception of "control center" and "precision" decreased. Accordingly, as age increased, the control of determining one's self-confidence in being healthy and able to change his health decreased; he could not concentrate his control center on himself and attributed being healthy to factors other than himself. In addition, an individual's knowledge about what to do to be healthier decreases with increasing age [18,19]. Therefore, focusing on the "control center" and "precision" sub-dimensions of health perception may effectively prevent diseases in older breeders.

Also, considering the 46.62-point average of the participants and that 15.75 points can be obtained from the original HPS, it can be said that the perception of health is at a moderate level [18,19]. In previous studies conducted by Şen et al. [20], and Kolaç et al. [21] in Türkiye, the mean HPS score was found to be 39.84 and 50.18, respectively (20,21). It is thought that this difference is due to the difference in the populations in which the research was conducted. Since the livestock sector contains processes within itself and as a result of these processes, its primary production material is living things, processes involve risks, among which diseases animals are exposed to are the most important, as they can cause high depreciation in production values. Therefore, farmers' perceptions of risk and health are expected to be high [4,6,22].

**Table 3.** Evaluation of Health Perception Scale (HPS) scores with knowledge of the participants about the transmission routes of zoonotic diseases from animals to humans (n=227)

| **Transmission ways** | **Categories** | **N (%)** | Scores of HPS | | |
|---|---|---|---|---|---|
| | | | Mean ± SD | Median (Min-Max) | p-value* |
| Ovine-to-human transmission | No | 87(38.3) | 45.74±5.31 | 45(36-70) | **0.003** |
| | Yes | 140(61.7) | 47.11±4.05 | 47(40-63) | |
| Bovine-to-human transmission | No | 80(35.2) | 45.41±4.99 | 46(36-63) | **0.001** |
| | Yes | 147(64.8) | 47.28±4.21 | 47(39-70) | |
| Human-to-human transmission | No | 96(42.2) | 45.86±4.61 | 45(36-63) | **0.007** |
| | Yes | 131(57.8) | 47.18±4.48 | 47(39-70) | |
| The barn environment -to-human transmission | No | 140(61.7) | 45.95±4.83 | 45(36-63) | 0.084 |
| | Yes | 87(38.3) | 46.04±4.23 | 47(39-70) | |
| Livestock milk-to-human transmission | No | 59(25.9) | 46.00±4.91 | 45(36-63) | 0.062 |
| | Yes | 168(74.1) | 46.91±4.40 | 46(39-70) | |
| Livestock meat-to-human transmission | No | 88(38.8) | 46.26±4.72 | 46(36-63) | 0.183 |
| | Yes | 139(61.2) | 46.84±4.49 | 47(39-70) | |

*Mann Whitney U Test

In their studies, Chand et al. [23] and Garforth et al. [22] found animal diseases to be one of the essential risks that farmers complained about and reported that their health perceptions about transmission routes were at a moderate level. It should be noted that the results of health perception assessment vary in different studies, which can be attributed to using different scales in different regions and studying with a small sample group. While 4.0% of the farmers in our study had experienced zoonosis, mostly brucella, 15% had received training from health personnel about the disease. In addition, the zoonosis they had the most idea about was brucella. It has been reported in studies conducted in Uganda and Italy that breeders have moderate knowledge of brucellosis [24,25]. Chikerema et al. [26] found farmers' rabies, anthrax, and brucellosis awareness levels to be 9.0%, 72.0%, and 21.0%, respectively.

In our study, more than 80.0% of the participants said that zoonotic diseases could be transmitted between animals. In addition, 90.0% of the farmers reported that they had vaccinated their animals and had been checked by a veterinarian. In the study of Hundal et al. [27] in Punjab, India, it was reported that more than 50.0% of breeders were aware of the transmission routes of zoonotic diseases to humans [27]. A study conducted among cattle farmers in Erzurum, Türkiye, reported that the farmers' knowledge levels of zoonotic diseases were high [28]. In the study of Singh et al., it was reported that 80.0% of livestock farmers in India had heard the term zoonosis and did not consume raw milk. Besides, 10.0% of this group had brucella and tuberculosis tests due to symptoms [3]. In the study of Rajkumar et al. [4] in Puducherry, India, 16.4% of the farmers knew that animal diseases could be transmitted to humans, and 43.2% reported foot and mouth disease (FMD) outbreaks in their cattle.

In Taştan et al.'s study [29] in Kocaeli-Türkiye among nurses, 73.0% of the participants stated that the infection was transmitted from animals to humans, 68.0% from humans to animals, and 16.0% stated that they were not transmitted at all. In addition, there are studies in the literature reporting low level of knowledge in those with a low level of education, advanced age, large families, and a high number of animals, and those living in low-income countries [3,4,6,8,28,30]. In our study, six out of ten farmers reported that diseases could be transmitted from animals to humans and between humans and that people can become infected due to consuming the milk and meat of sick animals. Informative education programs on common zoonoses are routinely implemented in Türkiye. In this respect, farmers' awareness of zoonoses is expected to be higher. Our study determined that the health perception of these three groups was higher than the group without transmission information. The least known way of transmission (38.0%) is the barn environment and its surroundings. And there is no difference between the health perception scores of the groups who know this transmission route and those who do not. These findings suggest that; the health perception score is partially effective in knowing the transmission routes of zoonotic diseases, but other factors affect it. Since the self-assessment scale and questionnaire were used in the research, the results are subjective. The results of this study have limitations regarding the generalization of all people at livestock breeders. The study sample consists of livestock breeders living in one province of Türkiye. It is thought that future studies in larger samples and geographically different regions may provide more effective results.

## Conclusion

The awareness and knowledge level of the livestock farmers, who are the subject of our research, about zoonoses is the key point in preventing zoonoses. A good understanding of endemic zoonotic diseases by farmers will enable human and animal health professionals to control emerging disease threats. In Türkiye, awareness-raising activities on the risks to farmers, health workers, and the public are carried out in policies related to animal husbandry. However, this study revealed that awareness of zoonotic diseases is not at the desired level. According to the result of our study, it affects the general health perception of the breeders, as well as their awareness of zoonoses. In order to reduce the risk of zoonotic transmission, it is necessary to increase the perception of health and awareness of zoonosis among farmers. Veterinarians and physicians should work together on the perception of health and awareness of zoonosis. Moreover, it can be recommended to carry out in-depth studies with farmers, veterinarians, doctors, and butchers focusing on knowledge, perception, and awareness about zoonoses to increase their knowledge and awareness about zoonoses.

### Abbreviation

HPS: Health Perception Scale; SD: Standard deviation; FMD: Foot and Mouth Disease

## Declaration

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### Availability of data and materials

Data will be available by emailing zerkesa@gmail.com.

### Authors' contributions

MY and İA participated in conceiving, designing, collecting data, drafting, and writing the manuscript. MY participated in collecting data. All authors have read and approved the final manuscript.

### Ethics approval and consent to participate

The research was performed in accordance with the principles of the Declaration of Helsinki. This study was approved by the Kutahya Health Sciences University Ethics Committee (Date: 2022, Number: 2022/02-19). Moreover, informed consent was obtained from each participant after explaining the study objectives and the guarantee of secrecy.

### Consent for publication

Not applicable

### Competing interest

### Open Access

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