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Evaluation of Farmers' Knowledge-Attitude-Practice About Zoonotic Diseases in Kars, Turkey

Kars İlinde Çiftçilerin Zoonotik Hastalıklara Yönelik Bilgi-Tutum-Davranışlarının Değerlendirilmesi

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ABSTRACT

AIM: *Zoonotic diseases constitute the majority of the community acquired infections. For the prevention of emerge and spread of the zoonotic diseases, providing information and behavioral training have important roles. The purpose of this study is to determine the knowledge, attitude and practice of Turkish livestock farmers in Digor, Kars.*

METHODS: *This cross-sectional, single center, prospective survey was conducted with 151 farmers. A survey form consisting of 32 questions and a demographic evaluation data form consisting of 10 questions were used to investigate eight zoonotic diseases diagnosed commonly in the region.*

RESULTS: *The results of the study showed that the sufficient knowledge level percentage of livestock farmers are very low (21.9%), 87.8% of farmers had the appropriate equipment regarding protection from zoonotic diseases; but 48.1% of the farmers couldn't totally reflect this knowledge and attitude on their practices. A statistically significant positive difference was determined between high education level and knowledge. Also, statistically significant positive difference was determined between fewer number of children and right attitude. Practices of participants with high monthly income were statistically favorable.*

CONCLUSION: *In this research which was planned as a preliminary study, it was observed that it is necessary to provide training which is informative and which may insure a change in the practices regarding zoonotic diseases for the same individuals.*

Key words: *agricultural worker's diseases; demography; information display; zoonotic diseases*

ÖZET

AMAÇ: *Zoonoz hastalıklar, toplum kökenli enfeksiyonların çoğunluğunu oluşturmaktadır. Bu hastalıkların oluşum ve yayılımının önlenmesinde, bilgilendirme ve davranışsal eğitimin rolü önemlidir. Bu çalışmanın amacı, Kars ili, Digor ilçesinde, çiftçilerin zoonoz hastalıklarla ilgili bilgi, tutum ve davranışlarını incelemektir.*

YÖNTEM: *Kesitsel, tek merkezli ve prospektif olan bu çalışma 151 çiftçi ile yapılmıştır. Bölgede yaygın olarak tanı alan sekiz zoonoz hastalığa yönelik olarak hazırlanmış, 32 sorudan oluşan anket formu ve 10 sorudan oluşan demografik değerlendirme veri formu kullanılmıştır.*

BULGULAR: *Çalışma bulguları hayvancılıkla uğraşan çiftçilerin zoonoz hastalıklara ilişkin yeterli bilgi düzeyinin oldukça düşük olduğunu (%21,9), çiftçilerin %87,8'inin bu hastalıklardan korunmak için uygun donanıma sahip olduğunu, ancak %48,1'inin bu bilgi ve tutumu tümüyle davranışlarına yansıtmadıklarını göstermiştir. Yüksek öğrenim düzeyi ve bilgi arasında istatistiksel olarak anlamlı doğrusal ilişki saptanmıştır. Ayrıca, daha az sayıda çocuğu olan katılımcıların anlamlı ölçüde doğru tutumlarının olduğu gözlenmiştir. Aylık geliri yüksek olan katılımcıların davranışları, istatistiksel olarak anlamlı ölçüde olumlu bulunmuştur*

SONUÇ: *Ön çalışma olarak planlanan bu araştırmada, aynı bireylere, zoonoz hastalıklara ilişkin bilgilendirici ve davranış değişikliği oluşturabilecek eğitim verilmesi gerektiği görülmüştür.*

Anahtar kelimeler: *tarım işçileri hastalıkları; demografi; bilgi sunumu; zoonozlar*

Introduction

Interactions between the living things living together are inevitable. Although it is compulsory to provide mutual benefit in interspecies relation for the continuity of life, once the balance is impaired the life is imperiled reciprocally. Zoonotic diseases are the most striking example which transferred between animals and persons in a natural way (*bacteria, parasite, fungi and virus*).

Woolhouse et al. noted that more than 700 human pathogens were considered zoonotic[1]. Zoonotic infections constitute 70% of the community acquired infections[2]. In the development of these diseases, the socio-cultural habits and socio-economic status

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have important effects. Poor countries are affected more from communicable and infectious diseases of which most are zoonotic and that the effects are more destructive[3-5].

Zoonotic diseses harmful to animal health are not only important because of the economic losses affecting the meat, milk and wool products but also because of their effects on food safety[6]. The control of zoonotic agents is the first condition for safe food[7]. For this reason, Pan American Health Organization (PAHO) established a veterinary public health program almost a hundred years ago to slow down the high mortality and incidence rate, and to prevent the serious financial losses in international trade, both caused by zoonotic. By the member countries developing, implementing this program and assessing the policies, the food safety and preservation, prevention, control and eradication of zoonotic diseases were provided[8]. Turkey has not been a member of PAHO but became a member of United Nations Food and Agriculture Organization (FAO) in 1948[9].

In the training of farmers regarding the zoonotic diseases the influence of the physician is emphasized[10]. A study in Colombia demonstrated that education led to behavioral changes among farmers, thus, allowing them to reduce occupational risks[11]. Eastern Anatolia is the region of Turkey in which animal husbandry are most extensive[12]. This study is planned to analyze the knowledge, attitude, and practice of the farmers regarding zoonotic diseases in Digor Town of Kars Province where agriculture and livestock are commonly practiced. Under the guidance of the findings to be obtained from this study, it is intended to provide a zoonotic diseases training for the farmers in the region.

Methods

Study Design

This epidemiological study was planned as single center, cross sectional and prospective. The reason for the study to be single centered is that training for the need regarding the zoonotic diseases in the same region according to the study findings was planned in advance. For this purpose, the study was conducted with 151 farmers in Digor town of Kars, between June-October 2013.

The study was conducted only with sheep, goat and cattle farmers. The poultry farmers were excluded from the study. As all the farmers had cats and dogs as a necessity of natural life, hydatic diseases (echinococcus granulosus) and toxoplasmosis were also analyzed. The Kafkas University Medical Faculty Ethics Committee (protocol number: 050-99/38) approved the study, and all participants provided verbal informed consent. Data were collected through face-to-face interviews.

Sample Size

The universe of the study consisted of all the farmers and livestock farmers in the town center. The total number of farmers in Kars Province was 1,464 (the universe of study) according to the 2001 Statistics of Animal Husbandry of Turkish Statistical Institute.[13] The sample size was calculated with Epi-Info Statcalc package 2000 program as 151 participants with 50% observation frequency, 10% deviation and 10% backup, in 95% confidence interval. The sample selection was made as non-random convenience.

Knowledge - Attitude - Practice Evaluation

The knowledge, attitude, and practice evaluation was made with a survey form consisting of 32 questions in total which was prepared for eight zoonotic diseases (ten questions were about knowledge, eleven questions were about attitude and eleven questions were about practice). Questionnaire form was prepared in this coverage; "how these diseases are spread", "which equipment is necessary in protection, and "what's the correct behavior for protection in actual life?". In scoring, every question was considered as one value and the scores above mean value (±five) are determined as informed on the disease, to have correct attitude and an accurate practitioner[14]. As the baseline of the survey, the questionnaire form was applied on ten people.

Interrogation of Demographic Characteristics

The socio-demographic characteristics of the participants were recorded at the same time with the evaluation form consisting of 10 questions. The entire study was conducted with the volunteers. It took one hour in average to complete all the forms for each individual. A second interview was made with the farmers whose demographic data were taken but who didn't allocate time to fill in the knowledge-attitude-practice survey due to their businesses. Therefore, the study was completed in a longer period than targeted. During data collection, the participants were asked "Do you want to have a training program on the subjects you do not know?" and all the participants were willing.

Zoonotic Diseases

In this study, knowledge, attitude, and practice measurements were made for the most common eight diseases (*Anthrax, Brucellosis, Crimean-Congo Hemorrhagic Fever, Rabies, Toxoplasmosis, Hydatid Disease, Giardiasis and Animal Tuberculosis*) in our country of the zoonotic diseases known to be approximately 800 around the world[1,15]. While the diseases were being analyzed, the disease was defined and the measurements were performed with the name known in the region or sometimes by not even using a name (not international name). What is intended here is to measure the actual knowledge of an individual about the disease, his/her attitude developed regarding the disease and the practices he/she implemented at the end. In this research which was planned as a preliminary study, the study was concluded by keeping the contact information of each participant confidential in a manner to ensure reaching the same individuals again regarding the training on zoonotic diseases.

Statistical Analysis

SPSS (IP number: 194.27.41.6) software was used for the data analysis. Percentage, distributions, frequency, arithmetic means and standard deviation (SD) were examined as descriptive statistics. Pearson's chi-square and Fisher's exact tests were used in to compare variables. The threshold for statistical significance was set at $p<0.05$.

Results

The study group ranged in age from 14 to 86 years old (mean: 41.75±18.46 years, 55% men). The percentage of illiterate subjects was 19.9%, while 21.2% of the subjects were literate without any schooling, and 33.8% had an elementary school education. It was determined that 73.5% of the participants were married. As there were no participants who were single with children and married, widow or divorced without children (Table 1), the average number of children was determined by eliminating the single individuals and the mean number of children was 5.97±3.94 (1-18).

The percentage of children involved in livestock works was 49.00%. From six individuals the necessary data could not be obtained. It was possible to assess the monthly income in 106 subjects and the median value was determined as 500 Turkish Liras (50-5000).

The percentage of subjects without health problems was 63.6%. The chronic diseases, hypertension, type-II diabetes mellitus and ischemic heart diseases, were seen in 36.4% and in 12 subjects (7.94%) active brucellosis was identified. The median value of the number of animals owned by the people was 15 animals (1-700) and ovine and/or bovine were not distinguished. The ratio of those receiving state support for livestock was determined to be 20.50%.

The ratio of those who knew elaborately how these diseases infect and how to protect from these diseases was 21.9%. The ratio of farmers who knew rudely that humans might be infected from animals was 96.7%. It was determined that Brucellosis was heard by 88.1% of the participant, Anthrax by 80.8%, Rabies by 46.4%, Crimean-Congo Hemorrhagic Fever by 27.8%, Hydatid Disease by 23.2%, Tuberculosis 20.5%, Toxoplasmosis and Giardiasis were heard by 0.7% of the participants (1 subject).

In the current study 87.8% of farmers had positive attitude, and 51.9% had positive practice. When the attitude and practices of the farmers regarding these diseases were assessed together, it was determined that 92.1% of the participants had an opinion that the animals should be regularly examined by the veterinarians against animal borne diseases, however only 35.8% of them practiced this.

Of the participants 98.7% stated that hands should be washed and 91.4% of the farmers expressed that they washed their hands. In addition, 92.1% of the

Table 1. *Educational level and the marital status of the farmers participated in the study dealing with the knowledge, attitude and practice in regards of zoonotic diseases*

Educational status	
Illiterate	30 (19.9)
Literate	32 (21.2)
Elementary School	51 (33.8)
Secondary School	23 (15.2)
High School	8 (5.3)
University	7 (4.6)
Marital Status	
Single	26 (17.2)
Married	111 (73.5)
Widow	12 (7.9)
Divorced	2 (1.3)

The data was presented with number (N) and percentage (%) values.

participants declared that they thought gloves should be used while contacting animals. The ratio of those using gloves was determined as 35.8%. In terms of using masks, 84.1% of the participants considered it as necessary but in practice, mask usage was observed as 6.6%, all of them were women and that they used their scarf as masks by closing their mouths. Regarding wearing water resistant boots during contact with animals, 89.4% of the farmers considered it as necessary but 42.4% of the farmers were wearing boots. The ratio of the participants who were thinking that they might be infected through a scar on the hand while contacting animals was 88.1%, and the ratio of farmers continuing to contact animals with a scar on their hand was determined to be 46.4%. In addition, 80.1% of the farmers knew that sick animal corpse should be buried deep. The ratio of those destroying the sick animal corpse by burying deep was identified to be 22.5% (Table 2).

Regarding boiling the milk, 84.8% of the subjects stated that the milk should be boiled, and the ratio of those consuming milk by boiling was 57.0%. The ratio of those who knew that cheese made of milk which was not boiled enough may cause diseases was 82.1%. The ratio of those making cheese from raw milk was 55.0%. The ratio of the farmers who knew eating raw meat might cause disease was 84.1%. The ratio of raw meat consumption was determined as 23.8%. The ratio of the participants who knew that animals like cats and dogs might cause diseases was 90.7%. The ratio of those preventing their children from contacting such animals was determined as 51.0% (Table 2).

The comparison of gender and age of the individuals (younger than 40 with 40 and elder) did not show significant differences of knowledge, attitude and practice regarding the animal borne diseases.

Reaching an educational level of a secondary school or higher significantly increased the knowledge level of the farmers ($p<0.05$), however their attitude ad practice did not change significantly. Knowledge and attitude of the married or single participants were similar however, married participants were practicing more cautiously ($p<0.05$).

Although their knowledge level and practice did not change, farmers having <5 children had significantly more positive attitudes ($p<0.05$).

Monthly income did not affect the knowledge and attitude, however positive practice was more common among the farmers with higher incomes ($p<0.05$).

Health problems, number of the owned animals or being a child worker did not change the knowledge, attitude and practice regarding with the zoonotic diseases. However, farmers without a state support had significantly more positive practices (Table 3).

Discussion

In this study; we determined that 51.9% of subjects practiced appropriately about zoonotic diseases. The strength of this study is that it is the first study conducted in Digor Town, Kars Province where 56.95% of the population lives in rural areas (the average percentage of the population living in rural areas is 22.72% nationwide)[13].

Agriculture and animal husbandry are suited to Kars Province because of its geographic and climatic features and large rural population[15]. In the last thirty-five years, Turkey has lost the characteristics of an agricultural country[16]. Nevertheless, residents in rural areas still rely on agriculture and animal husbandry for their livelihoods, mostly without any state support. In the Northeastern Anatolia Region, which encompasses the Kars Province, agriculture and animal husbandry comprised 24.6% of the gross domestic product (GDP) in 2009; the national average was 8.5%[14]. Therefore that's more important to provide healthy environment for agriculture and animal husbandry in this region. It's also significant to inform the farmers regarding zoonotic diseases.

In Australia, 60% of the land is used for agriculture and animal husbandry; studies there are currently being conducted to develop farmer-oriented educational services and programs. It was reported that providing such education and training to farmers and their families has resulted in a considerable decrease in the incidence of occupational diseases and accidents[17]. Various studies have demonstrated that training sessions to raise the awareness of zoonotic diseases (which are commonly observed among individuals who work in agriculture and raise animals) have contributed significantly to their prevention[18,19].

The agricultural, industrial, and service sectors in the Eastern Anatolia Region are all underdeveloped, while other social development indicators for the region, such as population, health, education, and prosperity, also rank below the national averages[20]. Also the fertility rate is notably high compared to the country (mean: 5.97; nationwide: 2.06)[21]. This situation was reflected clearly on the study findings.

Table 2. *The rates of positive attitudes and practices of the farmers in regards with zoonotic disease and protection against their contamination. The data was presented with number (n) and percentage (%) values.*

	Positive Attitude n (%)	Positive Practice n (%)
Regular veterinary control	139 (92.1)	54 (35.8)
Hand wash	149 (98.7)	138 (91.4)
Glove use	139 (92.1)	54(35.8)
Mask use	127 (84.1)	10 (6.6)
Boot wearing	135 (89.4)	64 (42.4)
Avoid contact with scary hands	133 (88.1)	81 (53.6)
Disposal of animal carcass	121 (80.1)	34 (22.5)
Boiling milk	128 (84.8)	86 (57.0)
Make cheese with boiled milk	124 (82.1)	68 (45.0)
Avoid raw meat eating	127 (84.1)	115 (76.2)

Table 3. *Comparison of some selected characteristics of farmers about their knowledge, attitude and practice about the zoonotic diseases*

Characteristics	Sufficient Knowledge n (%)	Positive Attitude n (%)	Positive Practice n (%)
Age < 40	22 (14.6)	83 (55.0%)	61 (40.4%)
Age ≥ 40	11 (7.3)	62 (41.1)	35 (23.2)
p value	0.625	0.123	0.666
Male	15 (9.9)	80 (53.0)	51 (33.8)
Female	18 (11.9)	65 (43.0)	45 (29.8)
p value	0.544	0.062	0.361
Education ≤ Primary School	13 (8.6)	57 (37.7)	29 (19.2)
Education ≥ Secondary School	20 (13.2)	88 (58.3)	67 (44.4)
p value	0.048	0.614	0.824
Single	2 (1.5)	24 (17.5)	17 (12.4)
Married	31 (22.6)	109 (79.6)	74 (54.0)
p value	0.717	0.579	0.016
Children < 6	22 (14.9)	90 (60.8)	64 (43.2)
Children ≥ 6	11 (7.4)	52 (35.1)	30 (20.3)
p value	0.182	0.027	0.323
Monthly income < 500 TRY	10 (9.4)	44 (41.5)	33 (31.1)
Monthly income ≥ 500 TRY	20 (18.9)	58 (54.7)	41 (38.7)
p value	0.421	0.523	0.047
Without health problem	17 (11.3)	91 (60.3)	63 (41.7)
With health problem	16 (10.6)	54 (35.8)	33 (21.9)
p value	0.653	0.153	0.478
Animals < 15	13 (8.7)	61 (40.9)	39 (26.2)
Animals ≥ 15	20 (13.4)	82 (55.0)	57 (38.3)
p value	0.308	0.350	0.987
Have state support	10 (6.6)	30 (19.9)	20 (13.2)
Do not have state support	23 (15.2)	115 (76.2)	76 (50.3)
p value	0.472	0.057	0.015
Child labor	12 (7.9)	72 (47.0)	37 (24.5)
No child labor	21 (13.9)	79 (49.0)	59 (39.1)
p value	0.701	0.002	0.550

In the current study, there was no significant difference according to the gender of the participants in knowledge, attitude and practices regarding eight zoonotic diseases, however the positive attitude scores of men were higher and in the analysis the positive attitude measurements of the men approached to significance level. In a study conducted in Kenya, it was reported that there were no differences between the genders regarding the knowledge for a zoonotic disease analyzed, but that the women were in the risk group for the zoonotic diseases[22]. The result of the study is consistent with this study. Das has shown that the women farmers were exposed less to the negative effects of the farming like accidental injuries compared to men[23]. In our study, there was no statistically significant difference in knowledge - attitude - practice scores according to age. In a study in the UK, it was reported that the younger farmers were more participative and willing for the control of zoonotic diseases[24].

When the participants were analyzed according to their marital status, there was no difference in knowledge and attitude; but in terms of practices, it was determined that the married subjects were in statistically significant higher positive practices regarding protection. It was reported in many studies that marriage has a protective importance for the health. It was also shown in the studies that the children are in risk group for all zoonotic diseases[25,26].

Child participation in agricultural and animal husbandry activities is a common observation worldwide and a decrease in the working age is also associated with an increased risk of respiratory diseases, musculoskeletal diseases, hearing loss, accidents, and injury[27]. In our study, the positive attitude ratio of the subjects whose children not involved in animal husbandry activities was significantly high. This situation indicated that the participants were willing to provide healthier conditions for their children but they were insufficient in modeling this with their practices.

In a study analyzing the relation of socio-economic status and zoonotic diseases, it was shown that the poor people were exposed more often to infectious diseases most of which consisted of zoonotic and that the impact of the diseases were more destructive[4]. As Wagstaff stated, "poverty and illness are intertwined, poor countries tend to have worse health outcomes than better-off countries"[28]. In Turkey, poverty is severe in rural areas, such as Eastern Anatolia. The absolute poverty line for Turkey was US $4 per capita per day (2006). Saatçi and Akpınar had reported the highest poverty rates for agricultural workers (46.6%), and in Eastern and Southeastern Anatolia 65.6% of the people working in the agricultural sector were poor[16].

Although the sufficient knowledge score in our study was low, the attitude score among those knowing was high and more than half of the knowing participants were practicing correctly. This result gave hope that in the event that the farmers are sufficiently informed, the positive attitudes may turn into positive practices in high levels. In Denmark, in a study where the biosafety perception of milk producers were analyzed, it was emphasized that the farmers thought that taking precautions against zoonotic risks was mainly for the public health rather than themselves and therefore they were not willing at all to take precautions against such diseases. In this study where it was reported that from the farmers' point of view, international branding was behind cost and effort, and that the accurate leading should be provided insistently to provide a change in the practices in farmers regarding zoonotic diseases[29]. In a study in the UK with buffalo farmers, the authors showed that a change in practices was necessary for the implementation of zoonotic diseases control programs[24].

The partnership of WHO, FAO and OIE for the zoonotic control in the world aims to eliminate the health risks encountered by the human-animal ecosystem[9]. In our country, within the scope of Ministry of Health, there are units established to fight against zoonotic diseases and the studies of the government on this matter continue effectively[14]. In a study conducted in Nairobi, it was reported that creating evidence based messages and communicating them to the public via press/broadcast channels might be effective in minimizing the zoonotic disease risks[6]. Surprisingly, in this study it was seen that the participants who were not receiving state support to practice livestock had statistically significantly higher practice score regarding the zoonotic diseases analyzed. This situation makes us think that the farmers who had to act all by their own responsibilities might felt an obligation to act properly in this direction.

Kersting et al, emphasized that the physicians were responsible for informing but it was not enough by itself and the healthcare providers, veterinarians and public health employees should provide farmers educative service in this subject[10]. Training of agricultural workers is also crucial to increase the agricultural quality and food safety.

In the findings of the study, it was determined that the knowledge level of the farmers in zoonotic diseases was low, they had the equipment to practice this knowledge but they did not reflect these to behavior. When the knowledge, attitude, and practice of the study group was reviewed in terms of education level, no differences were observed in attitude and practice but those with longer education period had significantly more knowledge about zoonotic disease. Nyangaga et al. showed that they provided a change in practice with the awareness training and brought healthy practice models[27].

Conclusion

This study was a preliminary study to determine the knowledge and skill requirements of livestock farmers regarding zoonotic diseases. The knowledge-attitute-practice of the farmers in regards to the zoonotic diseases seem below the desirable levels, thus providing training about the issue may provide beneficial effects.

References

1. Woolhouse ME, Gowtage-Sequeria S. Host range and emerging and reemerging pathogens. Emerg Infect Dis 2005; 11:1842-7.
2. Mahendra P, Sihin T, Pratibha D. Zoonoses occupationally acquired by abattoir workers. J Environ Occup Sci 2013;2:155-62.
3. Weber DJ, Rutala WA. Zoonotic infections. Occup Med 1999;14;247-84.
4. Seimenis A. Zoonoses and poverty- A long road to the alleviation of suffering. Vet Ital 2012;48:5-13.
5. Umar AS, Nura A. Training needs and risk assessment among farmers and animal handlers on zoonoses in Sokoto metropolis. Niger Postgrad Med J 2008;15:168-74.
6. Kang'ethe E, Kimani V, Grace D, et al. Development and delivery of evidence-based messages to reduce the risk of zoonoses in Nairobi, Kenya. Trop Anim Health Prod 2012;44:41-6.
7. Collins JD, Wall PG. Food safety and animal production systems: controlling zoonoses at farm level. Rev Sci Tech 2004;23:685-700.
8. PAHO: Zoonoses and Communıcable Dıseases Common To Man And Anımals. 3th ed. USA, 2001. (Cited 16 July 2013).Avaliable at: paho.org/hq/index.php?option=com_docman&task=doc).
9. FAO-OIE-WHO Collobaration, 2010. (Cited 16 July 2013). Avaliable at: www.who.int//tripartite concept_note
10. Kersting AL, Medeiros LC, LeJeune JT. Zoonoses and the physicians' role in educating farming patients. J Agromedicine 2009; 14:306-11.
11. Ospina JM, Manrique-Abril FG, Ariza NE. Educational intervention concerning knowledge and practices regarding work-related risks in potato farmers in Boyacá, Colombia. Rev Salud Publica (Bogota) 2009; 11:182-90.
12. TurkStat. [Turkish Statistical Institute, Statistics of Animal Husbandry] (Cited 28 May 2013): Avaliable at http://www.tuik.gov.tr
13. TurkStat. [Turkish Statistical Institute, Statistics of Demography] (Cited 28 May 2013): Avaliable at http://www.tuik.gov.tr
14. Tack DM, Blanton JD, Holman RC, et al. Evaluation of knowledge, attitudes, and practices of deer owners following identification of a cluster of captive deer with rabies in Pennsylvania in July 2010. J Am Vet Med Assoc 2013; 242:1279-85.
15. Ministry of Health of Turkey. Zoonotic Diseases Book, Ankara, 2011.
16. Saatçi E, Akpınar E. Assessing poverty and related factors in Turkey. Croat Med 2007; 48: 628-35.
17. Brumby S, Smith A. 'Train the trainer' model: implications for health professionals and farm family health in Australia. J Agromedicine 2009; 14:112-8.
18. Kersting AL, Medeiros LC, LeJeune JT. Zoonoses and the physicians' role in educating farming patients. J Agromedicine 2009; 14:306-11.
19. Umar AS, Nura A. Training needs and risk assessment among farmers and animal handlers on zoonoses in Sokoto metropolis. Niger Postgrad Med J 2008; 15:168-74.
20. Dinçer B, Özaslan M, Kavasoğlu T. Socio-economic development rankings of cities in Turkey. DPT, Ankara. 2003; 2671: 96-100.
21. Ministry of Health of Turkey Health Statistics Year Book Ankara, 2010.
22. Kimani VN, Mitoko G, McDermott B, et al. Social and gender determinants of risk of cryptosporidiosis, an emerging zoonotic, in Dagoretti, Nairobi, Kenya. Trop Anim Health Prod 2012; 1:17-23.
23. Das B. Agricultural work related injuries among the farmers of West Bengal, India. Int J Inj Contr Saf Promot 2014; 21:205-15.
24. Ellis-Iversen J, Cook AJ, Watson E, et al.Perceptions, circumstances and motivators that influence implementation of zoonotic control programs on cattle farms. Prev Vet Med 2010; 93:276-85.
25. Stull JW, Peregrine AS, Sargeant JM, et al. Pet husbandry and infection control practices related to zoonotic disease risks in Ontario, Canada. BMC Public Health 2013; 29:520-1.
26. Levallois P, Chevalier P, Gingras S, et al. Risk of infectious gastroenteritis in young children living in Québec rural areas with intensive animal farming: results of a case-control study (2004-2007). Zoonoses Public Health 2014; 61:28-38.
27. Nyangaga JN, Grace D, Kimani V, et al.Outcome mapping for fostering and measuring change in risk management behaviour among urban dairy farmers in Nairobi, Kenya. Trop Anim Health Prod 2012; 44:47-51.
28. Wagstaff A. Poverty and health sector inequalities. Bulletin of World Health Organization 2002; 80:97-105.
29. Kristensen E, Jakobsen EB. Danish dairy farmers' perception of biosecurity. Prev Vet Med 2011;99:122-9.