

*Full Length Research Paper*

# Perception of the public on the common zoonotic diseases in Jimma, Southwestern Ethiopia

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This study was conducted with the objective of assessing the perception of the public on common zoonotic diseases in Southwestern Ethiopia using a face-to-face interviewing technique. The respondents were stratified into four groups, namely: farmers (n=48), smallholder dairy farmers (n=44), butchers (n=34) and city residents (n=49). Many of them (97.1%) knew rabies was a zoonotic disease contracted via the bite and contact with saliva of a rabid dog. There was no statistically significant difference ( $P>0.05$ ) in the level of awareness about rabies in the four respondents groups. Taeniasis was the second most recognised zoonotic disease (84.3%). Anthrax was known by 55.4% of respondents, whereas only 29.1% of them knew tuberculosis can be transmitted from cattle to humans. There was a significant ( $P<0.05$ ) difference in the level of awareness with regard to zoonotic tuberculosis in the study groups where small holder dairy farmers had the highest awareness and traditional farmers had the lowest awareness. Majority of the respondents consume raw milk (66.8%), however, only 11.4% of them have knowledge about transmission of TB through raw milk and meat consumption. Awareness about echinococcosis was lower (4%) than other zoonotic diseases. The zoonotic importance of brucellosis was reported by none of the respondents. In general, the present study revealed a very low level of awareness by the public about major zoonotic diseases, signifying the need for public health promotion through education and inter-disciplinary one health approach with close collaboration among veterinarians, public health practitioners and policy makers.

**Key words:** Perception, public, transmission, zoonotic, disease, Ethiopia.

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## INTRODUCTION

The link among humans, animal populations and the surrounding environment is very close in many developing countries, where animals provide transportation, draught power, fuel, clothing and sources of protein (that is, meat, eggs, and milk). In the absence of proper care, this linkage can lead to a serious risk to public health with huge economic consequences (WHO, 2010).

Zoonoses are defined as those diseases and infections naturally transmitted between people and vertebrate animals (WHO, 2005). Zoonoses constitute a diverse group

of viral, bacterial, rickettsial, fungal, parasitic, and prion disease with a variety of animal reservoirs, including wild life, livestock, pet animals, and birds (Nkuchia et al., 2007). The transmission may occur through direct contact with the animal, through vectors (such as fleas or ticks), or through food or water contamination (James, 2005). Globally, zoonoses are said to account for 60% of all infectious disease pathogens and 75% of all emerging pathogens (WHO, 2004). In both developing and developed countries, a number of new zoonoses have emerged. This might be the result of either newly discovered

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pathogens or agents that are already known, usually appearing in animal species in which the disease had not previously been detected (Jonathan and Joshua, 2006). Many diseases that affect humans which are new, emerging and re-emerging, were caused by pathogens that originated from animals. Moreover, a number of zoonotic diseases, including rabies, brucellosis, bovine tuberculosis and echinococcosis continue to affect humans and animals in many countries, particularly developing nations (Meslin et al., 2000).

It has been observed that 75% of emerging pathogens fall within the category of zoonotic diseases (WHO, 2005). Zoonotic diseases cause mortality and morbidity in people, while also imposing significant economic losses in the livestock sector. Their burden tends to fall most heavily on poor societies (WHO, 2005). They have both direct and indirect effects on livestock health and production (Smits and Cutler, 2004). Indirect effects occur as a result of the risk of human disease, the economic impact on livestock producers through barriers to trade, the costs associated with control programmes, the increased cost of marketing produce to ensure it is safe for human consumption, and the loss of markets because of decreased consumer confidence (McDermott and Arimi, 2002).

Different studies conducted so far on animals from different districts of Jimma zone indicated the occurrence of zoonotic diseases. For example, Tolosa et al. (2009) reported the prevalence of 2.93 and 31.44% in Jimma area for *Taenia saginata* metacestodes and hydatid cysts, respectively. Prevalence values ranging from 2.93 to 4.4% was reported for bovine cysticercosis in cattle slaughtered at a Jimma abattoir (Megersa et al., 2010; Tolosa, 2010). Whereas, herd level and individual animal level prevalence of bovine tuberculosis was found to be 48.6 and 21.4%, respectively in and around Jimma (Tigre et al., 2012). Moreover, information from Jimma town health center and Jimma zone health bureau showed that rabies was one of the ten listed health problems in the area (personal communication). According to WHO (2011), rabies is a wide spread zoonotic disease that is found on all the continents, but more than 95% of human deaths occur in Asia and Africa.

The perception of the community towards zoonotic diseases plays an important role for the maintenance of life cycle and transmission of these diseases to the different arrays of their hosts. Studying the perception of the community on the risk factors, routes of transmission and life cycle of zoonotic diseases is a crucial step towards the development and implementation of appropriate disease prevention and control strategies. Though, the aforementioned zoonotic diseases were reported and found to be prevalent in Jimma and its surroundings, there was no study performed to assess of the overall perception of the community towards major zoonotic diseases in the area. Therefore, the objective of this study was to assess the public's perception regarding the major zoonotic diseases in and around Jimma town,

Ethiopia.

## MATERIALS AND METHODS

### Study area

The study was conducted in Jimma town and its surrounding villages from November, 2011 to April, 2012. Jimma town, which is the capital of Jimma zone, is located in Oromia Regional State at 346 km South West of Addis Ababa. The town has a latitude of about 7°36' to 8°N and longitude of about 35°52' to 37°37' E, and an elevation ranging from 880 to 3360 m above sea level. The area receives a mean annual rainfall of about 1,530 mm, which comes from long and short rainy seasons. The average minimum and maximum annual temperature ranges between 14.4 and 26.7°C, respectively. According to CSA (2009), Jimma town has a total population of 120,600.

### Study design and subjects

A questionnaire based cross-sectional study design was employed to look on the perception of the public on zoonotic diseases, that is, rabies, tuberculosis, anthrax, brucellosis, taeniasis and echinococcosis. The study populations were residents of Jimma town and its surrounding. The respondents were stratified into four groups, namely, farmers, smallholder dairy farmers, butchers, and city residents. Accordingly, 48 farmers, 44 smallholder dairy farmers, 34 butchers and 49 city residents were included in the study. The farmers included in the study were found in the villages around Jimma town and practice the mixed crop-livestock production system. Smallholder dairy farmers are found inside Jimma town and they are dependent on milk sell for their livelihood.

### Sampling method

A simple random sampling method was employed to select the respondents. Respondents were selected during questionnaire administration in different parts of the town and peasant associations around the town. During the questionnaire administration, any member of the households who was willing to participate in the interview was taken as a sampling unit.

### Study methodology

A semi-structured questionnaire was pre-tested and used for the face-to-face interview to evaluate the perception of the community about the common zoonotic disease (Unger and Munstermann, 2004). The two common local languages (Amharic and Oromiffa) were used for the interview. On average, 30 min were spent with each respondent. The questionnaire contains questions that can evaluate the perception of the respondents about zoonotic diseases' importance, their transmission cycle and major clinical signs in humans and animals. In addition, the respondents were also asked questions regarding the use of traditional medicine for the treatment of zoonotic diseases in their area. They were also asked if they had encountered anyone infected and/or that had died of zoonotic disease. According to the Oxford dictionary, perception, in this research is defined as the way in which something is regarded, understood, or interpreted.

### Data management and analysis

The data collected was properly coded and entered into a spreadsheet. Descriptive statistics, namely, mean, frequencies and

**Table 1.** Socio-demographic characteristics of the study participants.

Characteristic		Number	%
Age group	15-34	66	27.9
	35-49	73	46.3
	50-64	30	18.7
	> 64	6	7.1
Sex	Male	123	71.0
	Female	52	29.0
Educational status	Illiterate	32	18.4
	Basic education	143	81.6

**Table 2.** Mode of transmission of rabies perceived by respondents.

Transmission	Mode of transmission		
	Bite	Contact with saliva	Inhalation
	n (%)	n (%)	n (%)
Dog to dog	161 (92)	21 (12)	15 (8.6)
Dog to human	165 (94.3)	23 (13)	23 (9.7)

percentages were made to summarize the results using STATA Corp (2009). Logistic regression was used to see the influence of the different factors on the level of awareness on major zoonotic diseases. The knowledge of the importance of major zoonotic diseases was presented in the form of binary variable (yes=1 and no=0) and taken as the dependent variable, whereas occupation, sex, religion and level of educations were taken as explanatory variables. A P-value <0.05 was considered to represent a significant difference.

## RESULTS

### Socio-demographic characteristics of respondents

All of the rural residents were people living in villages surrounding Jimma town, whereas butchers, smallholder dairy farmers and city residents were found in Jimma town. Males accounted for 71% (123) and females 29% (52) of the respondents. The highest numbers of respondents were in age group 35 to 49 years. Regarding the educational level, 81.6% completed primary, secondary or higher education (Table 1).

### Knowledge and awareness about the common zoonotic diseases

#### Rabies

About 97.1% of the respondents said they were familiar that rabies can be transmitted from dogs to humans. The study revealed that about 95.8, 97.7, 97, and 89.8% of the traditional farmers, small holder dairy farmers, butchers,

band city residents interviewed, respectively, know that rabies is a zoonotic disease transmitted to humans. The knowledge of rabies as a zoonotic disease among the different respondent groups was not significantly ( $P>0.05$ ) different. The modes of transmission perceived by respondents were bites, contact with saliva, and inhalation (Table 2). The fate of an untreated person bitten by a rabid dog, as perceived by respondents, was death (82.8%), madness (33.7%), behavioral change (29%), and development of puppies in the abdominal cavity of the person (20%), but 3.43% of the respondents said they do not know what would happen to the person.

The major clinical signs of a rabid dog mentioned by respondents were salivation, biting humans and other animals, and dropping of tail (Table 3). The major combination of signs mentioned by the respondents was salivation plus human bites (Table 4). Among the persons interviewed, 46.2% of them encountered a rabid dog at least once in their life in their surroundings, and 28% of the respondents experienced a dog bite in their family.

#### Bovine tuberculosis

Of the total respondents, only 29.1% of them knew that tuberculosis can be transmitted from cattle to humans. The knowledge of tuberculosis as a zoonotic disease in the respondents interviewed was 50% in smallholder, 34% in city residents, 20.6% in butchers and 10.4% in traditional farmers. The awareness of respondents about the zoonotic importance of bovine tuberculosis was significantly higher ( $P<0.05$ ) in smallholder dairy farmers

**Table 3.** The clinical signs of rabies mentioned by the respondents.

Clinical sign	No. of respondents	%	Standard error
Salivation	63	36.5	3.65
Bite humans	62	35.6	3.64
Tail dropping	53	30.5	3.49
Bite animals	47	27	3.37
Wandering	44	25.2	3.30
Aggressiveness	35	20	3.04
Reddening of eyes	13	7.5	1.99
Madness	12	6.8	1.92
Hydrophobia	11	6.3	1.85
Anorexia	5	2.8	1.27
*Hb+Sal	48	27.4	3.4
*Ab+Hb	46	26.3	3.3
*Sal+Td+Hb	29	16.5	2.8
*Hb+Sal	15	8.5	2.1

\*Combination of signs mentioned by the respondents: Sal=salivation, Td=tail dropping, Hb=human biting, Ab= animal biting.

**Table 4.** Proportion of respondents having awareness about transmission of tuberculosis through consumption of raw meat and milk.

Respondents' category	Number asked	Number having awareness	%	SE	P-value
Farmers	48	5	10.4	4.4	-
Smallholder dairy farmers	44	22	50	7.6	0.00
Butchers	34	7	20.6	7.0	0.207
City residents	49	17	34.7	6.8	0.007

**Table 5.** Mode of transmission of anthrax from animals to humans reported by the respondents.

Mode of transmission	No. respondents	%	SE
Consumption of raw meat	96	54.9	1.13
Contact	25	14.3	2.65
Inhalation	4	2.3	3.77

followed by city residents (Table 5). However, the habit of raw milk consumption was significantly higher in traditional farmers ( $P<0.05$ ) (91.6%) as compared to 54.5% in smallholder dairy farmers, 58.8% in butchers and 59.2% in city residents. The risk of raw meat and milk consumption as perceived by respondents were diarrhea (unspecified cause), tuberculosis, typhoid, amoeba and taeniasis.

### Taeniasis (*Cysticercus bovis*)

The overall proportion of respondents having knowledge of taeniasis as a zoonotic disease was 83.4%. Taeniasis was perceived by 94.1% of butchers, 90.9% of small holder, 87.7% of city residents and 64.5% of the

traditional farmers as a zoonotic disease transmitted to humans when raw meat is consumed. In addition to consumption of raw meat, 31% of the respondents reported that it can be transmitted by consumption of raw milk. The infection of cattle by the eggs of *T. saginata* was known only by 27.45% (48/175) of the interviewed persons. Regarding consumption of raw meat, 69.1% (121/175) of the respondents have the habit of raw meat consumption. Among those who consume raw meat, 82.6% (100/121) of them have been infected by *T. saginata* at least once previously.

Infection of *T. saginata* was 66.6, 82.1, 87.1 and 90.3% in the traditional farmers, small holder dairy farmers, butchers and city residents, respectively. The infection rate in the farmers was significantly ( $P<0.05$ ) lower than that of the city residents, whereas sex, level of education

and religion of respondents did not show significant level of variation in the prevalence of taeniasis. However, the probability of getting infected was observed to be associated directly and significantly ( $P < 0.05$ ) with age.

Many of the respondents (77.7%) mentioned that traditional medicine was effective for *T. saginata*. Traditional medicine mentioned by respondents was “Enkoko” (*Embelia schimperi*), “kosso” (*Hagenia abyssinica*) and seed of pumpkin. The knowledge of traditional medicine for *T. saginata* in the four respondent groups was not significantly different ( $P > 0.05$ ).

### ***Echinococcosis***

In the study area, *Echinococcosis* was known only by 4% (7/175) of interviewed persons as a zoonotic disease transmitted from dogs to humans. However, 19.4% (34/175) of the respondents said they had noticed parasitic disease in dogs, but had no information whether it can be transmitted to humans or not. The clinical signs they mentioned for parasitic infestation in dogs by respondents were reduced appetite, vomiting, excretion of adult parasites and/or proglotides of cestodes with feces and eating grass. Among the persons interviewed, 56% (98/175) owned dogs, but only 25.5% (25/98) of them vaccinate their dogs regularly. Moreover, 31.6% of them allow their dog to roam outside their compound. The feeding practice of dog owners was also assessed and the result showed that 41.8% (41/98) of the dog owners feed raw condemned visceral organs without cooking or checking for any abnormality on the organs.

### ***Anthrax***

Anthrax was known as a zoonotic disease transmitted to humans by 51, 51, 67.6, and 79.6% of farmers, small holders, butchers, and city residents, respectively. The modes of transmission reported by respondents were consumption of raw meat from infected animal, contact, and inhalation (Table 5). Most of the respondents reported that consumption of meat from infected animals was the major source of infection for humans.

### ***Brucellosis***

Respondents were asked if they were aware of a disease that can cause abortion in cattle and transmitted to humans. But none of the respondents were aware of such a disease.

## **DISCUSSION**

The most frequently known zoonotic diseases among the respondents in the study area were rabies (97.1%), followed by taeniasis (83.4%), anthrax (55.4%), bovine tuberculosis (29.1%) and hydatidosis (4%). This study

indicated a relatively lower level of awareness of the respondents in the study area as compared to the report of Girma et al. (2012) who indicated that all respondents in Addis Ababa mentioned rabies as a zoonotic disease, followed by anthrax (94.27%), taeniasis (89.06%), bovine tuberculosis (88.54%) and brucellosis (49.48%). The difference in the overall awareness between the two study sites for the common zoonotic diseases could be due to variations in the living style between the two settings, where in Addis Ababa, as a capital city, information might be acquired more easily than in the current study area.

With regard to the perception of rabies as a zoonotic disease, there was no significantly ( $P > 0.05$ ) different level of awareness among the different respondent groups which can imply that rabies is a well known disease in the area. This is evidenced by the fact that a higher proportion (94.3%) of the respondents knew the means of transmission of rabies from dog to humans. Moreover, 82.9% of the respondents said that untreated cases of rabies in humans can result in death. Another 25.7% of the study participants reported that at least one family member was bitten by a suspected rabid dog previously. This is in line with the work of Girma et al. (2012) who reported rabies as the most frequently (100%) mentioned zoonotic diseases in Addis Ababa. However, 20% of the respondents in the current study seem to misunderstand the consequence of untreated rabies cases in humans where development of puppies in the abdominal cavity of the person was mentioned. This signifies the need for awareness creation about rabies in the area. Among the respondents who owned dogs, only, 25.6% of them reported that they were treating or vaccinating their dogs. The poor management of owned dogs and the presence of high populations of unvaccinated stray dogs are responsible for the frequent occurrence of rabies (Deressa et al., 2010). Globally, about 55,000 persons die annually due to rabies where rabid dog bites account for 99% of the infection (WHO, 2011).

Of the total respondents, only 29.1% of them knew tuberculosis can be transmitted from cattle to humans. This is in line with the work of Amenu et al. (2010) who reported that a high number of respondents had no detailed and accurate knowledge about zoonotic tuberculosis. In this study, inhalational route and consumption of raw milk and meat were mentioned as transmission routes from cattle to humans. There was a significant ( $P < 0.05$ ) difference in the level of awareness with regard to the zoonotic tuberculosis in the study groups where small holder dairy farmers had the highest awareness and traditional farmers had the lowest awareness. However, traditional farmers were found as the major consumers of raw milk. This might put traditional farmers as the most vulnerable group as far as zoonotic tuberculosis is concerned. The relatively higher level of awareness among the smallholder dairy farmers could be attributed to their living inside the town that might facilitate to have information about the zoonotic importance of bovine tuberculosis from private veterinary practitioners. Ashford

et al. (2001) stated that in countries where bovine tuberculosis is common and pasteurization of milk has not been practiced widely, an estimated 10 to 15% of human tuberculosis cases are caused by *Mycobacterium bovis*.

The overall proportion of respondents having the knowledge that taeniasis is a zoonotic disease was 83.4%. Raw/undercooked meat consumption as a vehicle for transmission of taeniasis to humans was indicated by 82.3%. But 31% of them said raw milk can also transmit *T. saginata* which shows lack of knowledge about the disease to some extent. Respondents in the current study area seem to have relatively lower awareness about *T. saginata* as compared to a study conducted at Arsi-Negele district, Southern Ethiopia, by Amenu et al. (2010) who indicated that 96.3% of the respondents knew that raw meat was a vehicle for disease transmission to humans. The difference could be due to lack of information about the disease in the current study area.

However, raw meat consumption in the area is wide spread (69.1%) and 82.6% of the respondents who consume raw meat had *T. saginata* previously. An infection rate of 64.2% was reported in a study conducted by Abunna et al. (2008) at Hawassa town. The level of infection in the different educational levels, sex and religious groups was not significantly different. This could be due to the deep rooted culture of consuming raw meat in the different social groups of the country, even by highly educated individuals (Abunna et al., 2008). However, the probability of infection was observed to rise with increasing age. This could be attributed to the fact that elderly individuals have the chance to consume more raw meat in different social ceremonies such as wedding and other local holy days, where raw meat is one of the major food items served almost everywhere in the country. A similar finding was reported by Megersa et al. (2010) in Jimma where older people were more infected with *T. saginata* than the younger ones. Raw meat consumption is practiced in some parts of the world as a cultural heritage passed through many generations. Countries like Russia, Cuba and many social groups on the African continent are known to consume raw and/or undercooked meat (Suárez and Santizo, 2005). In spite of the relative higher perception of the respondents about the zoonotic importance of taeniasis, the consumption rate of raw meat and also the infection rate of taeniasis is found to be high. This seems to be attributed to the deep rooted culture of raw meat consumption in the country. To safe guard the public, an intensive awareness creation programs should be undertaken in the area regarding the danger of raw meat consumption which not only predispose to taeniasis, but also to other very serious food borne pathogens like anthrax and bovine tuberculosis.

In the current study, only a small proportion (4%) of the participants had an awareness of echinococcosis. This disagrees with the work of Tigre (2012) who reported that

32.2% of the study participants had an awareness of echinococcosis. The variation in the level of awareness could be due to the difference in the study groups, where the previous study was conducted only on butchers and abattoir workers who might be familiar with the problem unlike our study groups which incorporates a variety of respondents. The awareness level of participants in this study was similar to that reported by Kebede et al. (2010) and Zelalem (2012) who indicated an awareness level of 0 and 8% of the households had awareness about zoonotic echinococcosis, respectively. The lower level of awareness about echinococcosis could also be due to the longer incubation period of the disease in humans, in which it takes up to 30 years to manifest clinical signs (CFSPH, 2011).

In this study, 25.5% of the participants owned dog(s) and 56% of them said they let their dogs freely roam outside their compound. The presence of large numbers of non-restricted dogs plays a crucial role not only in transmission of rabies but also in contaminating the environment with tapeworm eggs which could subsequently infect humans. Among the dog owners, 68.9% of them reported that they fed offal to their dogs regardless of the safety status of the offal. Feeding the viscera of infected slaughter animals to dogs was reported to facilitate the transmission of the sheep strain of *Echinococcus granulosus* and this was suggested to consequently increase the risk that humans will become infected (Moro and Schantz, 2009). According to a study conducted by Carmena et al. (1998), the type of feed given to dogs was found to significantly affect the prevalence of cystic echinococcosis in humans. Tigre (2012) reported that only 4.3% of the dog owners treat their dogs with anthelmintic drugs periodically around Jimma area. In order to eliminate the infection risk to humans living in close association with the infected dog, either euthanasia of such dogs or chemotherapy under strict safety precaution has been recommended (Ekerte and Peter, 2004).

The knowledge of the study population about the zoonotic importance of anthrax was limited. Transmission through the consumption of raw meat was mentioned by 54.9% of the respondents, whereas contact and inhalational transmission routes were only mentioned by 14.3 and 2.3% of respondents, respectively. The low level of awareness about the zoonotic importance of anthrax in the area is of concern given that the disease is endemic in most part of the country and the case fatality rate is very high both in humans and animals. The wide spread culture of raw meat consumption combined with the lower level of awareness about anthrax seems to put the public at a greater risk of contracting the disease.

Among the six common zoonotic diseases, only brucellosis was not known by any one of the interviewed persons. This is in contrast to Mihiret-ab (2012) who reported that 5.6% of the respondents were aware of the zoonotic importance of brucellosis in and around Dire Dawa. The absence of awareness in the present study

area might be due to poor or absent awareness creation activities that should have been given by the public health bureau of the area and the veterinary department.

Conclusively, the public awareness about some common zoonotic diseases and their means of transmission, especially bovine tuberculosis, echinococcosis, anthrax and brucellosis was very low. The level of awareness about rabies in this study was good but improvements are needed on the management and proper handling of dogs. Awareness should be created in the public regarding the life cycles of the common zoonotic diseases in the area. The public health department of the ministry of health should give due emphasis for public educating and awareness creation on preventive measures for the existing zoonotic diseases in the area at the grass root level using the health extension workers.

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