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ORIGINAL RESEARCH

Household Practice Related to Zoonotic Diseases Transmission in Rural Community of Gondar Zuria District

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Purpose: The study was done from October 2019 to April 2020 for the purpose of identifying practices and characterizing the general public knowledge, attitudes and associated risk factors related to animal contact that influence zoonotic disease transmission in the rural household heads of North Gondar area, Amhara Regional State, Ethiopia.

Patients and Methods: During this study, a cross-sectional type of study was designed and a simple random sampling method was used to choose kebeles. Six kebeles were randomly selected using a lottery method. Systematic random sampling method was employed to select and question 65 household heads from each of the kebeles. In total, 390 structured questionnaires were prepared for those household heads and the data were collected using face to face interviews. Finally, the recorded data were examined using STATA version 16 statistical software and the frequency distribution of both variables was observed using descriptive statistics. Linear regression model was used to see the relation between household practices and the explanatory factors.

Results: The results showed that there was a gender difference in responsibility for managing livestock and the central aim of rearing livestock was for sale. Among 390 members of households, 38.7% understand a probability of disease transmission in their community between livestock, humans and wildlife, regardless of the fact that household practices related to zoonosis transmission were common. Of the households, 52.3% responded that they permit animals to go into kitchen and sleeping areas (95% CI = 1.15–2.73; P = 0.009). The factors which influence the household practices were agro-ecology activities; livestock management; number of individuals in the household; types of livestock reared; and zoonosis awareness.

Conclusion: In general, the present study showed that the public had a very low awareness about major zoonotic diseases. This indicates the need for awareness creation through education and an inter-disciplinary health approach with close collaboration among veterinarians, public health practitioners and policymakers.

Keywords: animal contact, attitude, Gondar rural area, knowledge, risk factors, zoonosis diseases transmission

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Introduction

Zoonotic diseases are those that can be transmitted between animals and humans, and they can cause high risks for exposed people. The occurrence of zoonosis and its impact on human health are a growing concern around the world. Brucellosis, rabies, African trypanosomiasis, bovine tuberculosis, cysticercosis, echinococcosis, and anthrax are registered as major, dangerous endemic zoonotic diseases. In non-developed countries

they pose a danger to human health, especially for societies that domesticate and breed animals for food and clothing.[1] Food security could also be affected by zoonotic diseases worldwide.[2]

Individual human practices that influence zoonotic infections have been increasingly known in recent years as means of exposure to zoonotic agents. These factors are often the result of globalization and the simplicity of international travel.[3] The high number (60.3%) of evolving infectious diseases are zoonotic. Out of approximately 1500 pathogens that are considered as infectious to humans, 66 of them are protozoa and 287 are helminthes. These denote that the disease burden is huge and the patterns of the burden of disease and its occurrence are changing. The growth of population and socio-economic fluctuations are the two key factors that can affect the movement of populations into new areas and modification of animal management activities that influence the occurrence of diseases and their associated problems. Moreover, better-quality diagnostics indicate that currently several zoonoses are going to have a greater burden than shown in previous documentation.[4]

Numerous zoonotic diseases affect both the health of humans and production of livestock. People that depend on livestock have encountered not only a direct threat of zoonotic diseases but also they are vulnerable to indirect effects due to resulting reduced livestock production and food security which exacerbates poverty. Above 600 million people are estimated to be dependent on livestock globally and they represent around 70% of the population in marginal areas. Because of economic, socio-cultural and geographic factors, they lack access to health care, communication, political processes and education which aggravates the problem of health-care delivery systems and awareness creation.[5] Despite small-scale production having a huge role as a means of income and nutrition for the people who live in developing countries, it can enhance the risk of zoonosis especially in young children.[6] Therefore, in order to alleviate the risk of zoonosis through controland prevention, better understanding is required about how livestock producers understand and cope with the disease transmission risks. However in Ethiopia, particularly in Gondar district, there is no such type of previous study. Therefore, the purposes of this research work are to characterize the general public understanding, outlooks and associated risk factors related to animal contact in households for zoonotic disease transmission and to find practices that are known to influence zoonosis transmission in Gondar rural household.

Patients and Methods

Study Region

This research was done from October 2019–April 2020 in Gondar Zuria district rural communities, Gondar, Ethiopia. The study area is 750 km away from the capital city of the country, Addis Ababa. It is located between 12.3–13.38º and 35.5–38.3º north latitudes and east longitudes, respectively. The minimum and maximum altitude is found between 550 (in western lowland) and 4620 (in north Semen Mountain) meters above sea level (m asl).[7] According to the Gondar Zuria Development Agriculture office District annual report in 2013, the entire population of Gondar numbers 222,377. Of these, 112,248 are men and 110,129 are women.[8] Ninety percent of the population in the district are rural inhabitants and 35 "kebeles" which is the smallest administrative unit are found in the district.[9]

Research Strategy and Study Population

The research was completed using a cross-sectional study design on the communities household practice related to zoonotic diseases transmission and associated risk factors. The study population was the communities who lived in randomly selected kebeles of Gondar Zuria district and the questionnaires survey was conducted using face to face interview.

Calculation of the Sample Size

The number of samples was estimated by considering 50% expected prevalence because the study on the household practice related to zoonotic diseases transmission in the study area has not been done before. The Thrusfield formula was used to estimate the number of samples using 5% absolute precision and 95% confidence interval as follows:[10]

$N = \frac{1.962Pexp(1-Pexp)}{d2}$; Where Number of sample size is denoted by N; Expected prevalence (50%) by Pexp and Required absolute precision (5%) by d.[2]

According to this formula, the study population was estimated as 384 household respondents. However, 390 samples were taken to increase the precision.

Data Collection Methods

During the study, a simple random sampling method was conducted to choose kebeles. Using a lottery method, out of 35 kebeles in the district, six were randomly selected

and a systematic random sampling method was employed to select and question 65 households' heads from each kebele. In total, 390 structured questionnaires were prepared for the participants. The questionnaire was first written in English and then translated into the native language (Amharic) for convenience of approaching the interviewees. To evaluate the reliability and validity of the survey questionnaire prior to its final distribution, it was also pre-tested by asking 10 randomly selected individuals from the target population to complete it. Finally, it was collected using face to face interviews.

Data Management and Analysis

The data were analyzed after each questionnaire was checked carefully and any questionnaires with unclear or ambiguous answers were excluded. Then, they were coded and entered into Microsoft Excel and transferred to STATA version 16 statistical software. During analysis, the participants' ages were grouped as between 20–35, 36–45 and greater than 45 and their educational status was also classified as illiterate, primary school, secondary school and above. Additionally, descriptive statistics analysis and univariate analysis (linear regression) were also done to summarize and see the association between the household practices with different explanatory factors. Finally, P value less than 0.05 ($P<0.05$) is considered as significance level.

Result

Socio-Demographic Data of the Respondents

During this research period, 390 family members in each household were interviewed and all the respondents' questionnaires were found to be complete and considered for analysis. Above half of the respondents (218; 55.8%) were females while the remaining 172 (44.2%) were men. Additionally, the majority (43.9%) of participants grouped between 20–35 years old whereas others were in the age groups of 36–45 (39.7%) and >46 (16.4%) years old. Furthermore, 265 (67.9%) of the participants were illiterate and the remaining 125 (32.1%) were literate and had studied up to primary school.

Human Health

Out of 390 respondents, 195 (50%) households' main sources of water were untreated while 195 (50%) households used tap water for human consumption. The majority of the respondents (225 (57.7%) and 336 (86.2%)) reported that they practice eating of undercooked meat and feed their livestock uncooked meat waste, respectively. Whereas, few respondents (20; 5.1%) cull sick animals for consumption. Additionally, while 182 (46.7%) of participants reported the practice of cleaning their hands using soap before and after cooking, only 1 (0.3%) of the respondents reported that they eat animals found dead. Moreover, the practice of hand washing using soap after handling of living animals was reported by 186 (47.7%) of the respondents while the practice of keeping live animals away from kitchen and sleeping areas was found to be maintained by 190 (48.7%). The practice of disposing of meat waste products was mentioned by 184 (47.2%) of the respondents. Whereas, indoors and outdoors daily collection of manure was made by 172 (44.1%) of the respondents and 165 (42.3%) of the respondents mentioned that they hold and slaughter wild animals for feeding. Furthermore, among the 390 respondents, 379 (97.2%) of them slaughter domestic animals (Table 1).

The results indicate that there was a significant association between the practices in the household with different explanatory factors. All the response variables except eating animals found dead; culling sick animals for consumption and slaughtering domestic animals were related with a minimum of one explanatory factor and the respondents who understand about zoonosis and disease transmission between animals and humans in their village were more likely to repeatedly practice these other activities. Feeding animals with uncooked slaughter waste products ($p<0.05$) was associated with kebele. In addition to this, cleaning hands before and after cooking was frequently mentioned in household individuals who have good knowledge of zoonosis and it is significantly associated with education ($P = 0.012$). Moreover, the practice of washing hands using soap after handling of live animals were associated with education ($P = 0.07$) and similarly, it was frequently mentioned in respondents who have better knowledge of zoonosis. In the same manner, keeping animals away from kitchen and sleeping areas were related with educational status ($P = 0.009$) and disposal of meat waste products was associated with knowledge of zoonosis ($P = 0.001$). The households that raise more cattle had also significant association with the practice of daily collection of manure indoors and outdoors ($P = 0.002$) and

Table 1 The Frequency and Association of the Household Practice and the Possible Explanatory Factors

Household Practice	No of Respondents' (n (%))	Explanatory Factor	OR (95% CI)	P-value
Eat undercooked meat	225 (57.7)	Sex	0.72(0.59–0.87)	0.001
Feed their livestock uncooked meat waste	336 (86.2)	Kebele	0.75(0.62–0.90)	0.002
Cull sick animals for consumption	20 (5.1)	Education	1.11(0.59–2.08)	0.73
Eat animals found dead	1 (0.3)	Have knowledge of zoonosis	1.27(0.89–1.822)	0.18
Wash hands using soap before and after cooking	182 (46.7)	Education	1.74(1.13–2.67)	0.012
Wash hands using soap after handling live animals	186 (47.7)	Education Incidence of disease after new stock is introduced in to the village	1.79(1.17–2.77) 1.61(1.27–2.03)	0.007 0.000
Prohibiting animals from entry into sleeping and food preparation areas	190 (48.7)	Education	1.78(1.15–2.73	0.009
Disposing of meat waste products	184 (47.2)	Have knowledge of zoonosis	1.48(1.17–1.86	0.001
Daily collection of manure indoors and outdoor	172 (44.1)	Number of cattle	0.74(0.59–0.94)	0.002
Capture and slaughter wild animals for consumption	165 (42.3)	Kebele	0.8(0.71–0.90)	0.000
Slaughter domestic animals	379 (97.2)	Education	0.8(0.53–1.27)	0.2

a similar association was found between the practice of capture and slaughter of domestic animals for consumption and kebele (P = 0.00) (Table 1).

Rntire households with existing disease conditions were detected; 51.8% of respondents reported that they were suffered from digestive problems (bloody diarrhea or stool (16.7%), diarrhea or loose stool (12.3%) and abdominal pain (22.8%)). Further, 19.2% of respondents had reported headache or body ache; 20.3% vomiting; and 37.4% respiratory problems such as cough (19.2%) and shortness of breath (18.2%). Fever is a common sign of any disease, and its history was reported in 22.3% of study participants (Table 2).

Livestock Management

The main aim of rearing livestock was for selling; 293 (75.1%) and 304 (77.9%) of sheep and goat, respectively are raised to be sold while 387 (99.2%) of cattle were reared for sale during an emergency. All respondents used their horses and donkeys for draught power. The responsibility of handling different species of animals between sex groups indicated that women had more responsibility for cattle in 224 (54.4%) of the households while men had higher responsibility for horses in 245 (62.8%) of the households. Children were also more responsible for donkeys in 249 (63.8%), goats in 240 (61.5%), sheep in 234 (60%), and cattle in 67 (17.2%) households (Table 3).

Table 2 Members of Households Suffered from the Sign of Diseases During the Last 14 Days

Variables	Number of Respondents (n)	Percent (%)
Diarrhea or loose stool	48	12.3
Bloody diarrhea or stool	65	16.7
Abdominal pain	89	22.8
Fever	87	22.3
Headache or body ache	75	19.2
Cough	75	19.2
Shortness of breath	71	18.2
Vomiting	79	20.3

Table 3 The Aim of Livestock Owners for Livestock Production and Their Responsibility

Variables	Cattle n (%)	Sheep n (%)	Goat n (%)	Donkey n (%)	Horse n (%)
Livestock responsibility					
Employees	95(24.4)	95(24.4)	101(25.9)	95(24.4%)	96(24.6)
Women	224(54.4)	58(14.9)	41(10.5)	30(7.7%)	8(7.2)
Men	4(1)	3(0.8)	8(2.1)	16(4.1%)	245(62.8)
Children	67(17.2)	234(60)	240(61.5)	249(63.8%)	21(5.4)
Purpose of livestock production					
Sale	3(0.8)	293(75.1)	304 (77.9)	–	–
Family consumption	–	61(15.6)	55(14.1)	–	–
Emergency sale	387(99.2)	36(9.2)	31(7.9)	–	–
Draught power	–	–	–	390(100)	390(100)

Likelihood and Knowledge of Zoonosis

Out of 390 respondents, 151 (38.7%) of households had an idea of how diseases are transmitted between animals and humans and possibly occur within their community and 72% of the respondents had knowledge about how diseases are transmitted between them. Most (85%) of household respondents also explained that rabies is the main zoonotic disease that is known, which is locally named as "Yebed Wusha Beshata" or "Likift". Anthrax (aba-Senga) and tuberculosis were also noted by 11.4% and 4.6% of households, respectively (Figure 1).

Discussion

The present study was employed to identify the household practices and characterize the knowledge, attitudes and associated risk factors governing transmission of zoonotic diseases in Gondar Zuria district rural community. The demographic data of this study showed that, out of 390 respondents, 55.8% were females and the remaining 44.2% were males. All individual participants in this study had a family size of more than one and 43.9% of them were aged between 20–35 while 39.7% were between 36–45 and the rest (16.4%) were above 46 years

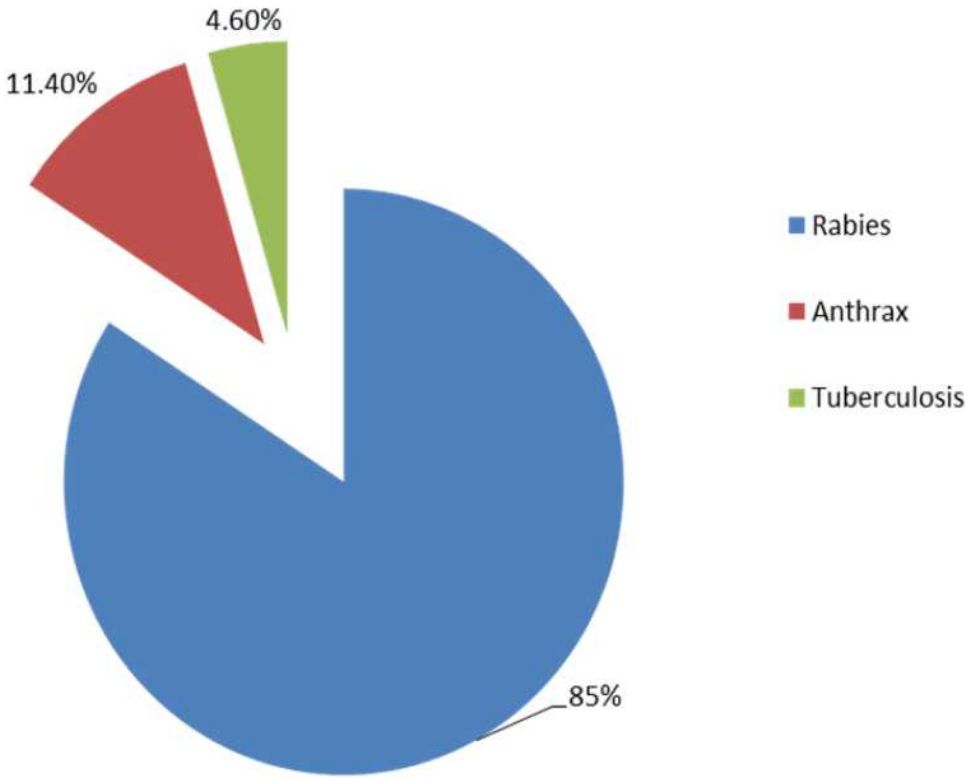

Figure 1 Zoonotic diseases known by the study participants.

old. The responses on educational status indicated that 67.9% of the participants were illiterate and, 32.1% were literate and had studied up to primary school. The education level had a significant difference (P = 0.012) with the practice of washing hands with soap before and after cooking of food.

The results indicated that, from 390 household respondents, 239 (61.3%) did not know about the transmission of diseases between livestock, human and wildlife in their settlement. This could be because awareness creation about zoonotic disease is not done in this community. Thus, many households perform activities that could enhance the chance of pathogen exposure which causes zoonosis. Also this research showed that many people had no knowledge of zoonotic diseases that could severely affect their health and the health of their families. Therefore, it is important to find effective means of delivering information to the public in order to correct this shortage of knowledge. However, rabies was mentioned as a main zoonotic disease by 85% of the respondents and similar result was reported by Ali et al. (2013),[11] but a higher result was reported by Nigatu et al. (2016).[12] This might be due to the higher prevalence of awareness of the community specifically for this zoonotic disease. The results also showed that there is a significant association between household practices and agro-ecology; the number of individuals in a household; species of animals reared in the household and their husbandry system.

Additionally, the responsibility of livestock rearing and the aim behind rearing different livestock species were different and had gender divisions.

In this study, the previously documented household practices that are related with zoonotic transmission were identified and analyzed to include various transmission routes of pathogens that are known to transmit between animals and humans. The results indicated that the practice of disposing of meat waste products is associated with a high number of individuals in a household. This could be due to the households who have high numbers of family members need to dispose of a large volume of household waste effectively. This result agrees with the reports of Osbjer et al. (2015).[2] Household practices such as discarding sick animals for consumption and eating dead animals were practiced in 25% of the households in a previous study.[12] However, this finding is not in line with the present study. The knowledge about zoonosis was positively associated with the practice of cleaning hands before cooking and after handling of animals. But the association with other practices was negative. Feeding animals with undercooked waste products and carrying out slaughter were highly practiced in respondents that have low level of knowledge about zoonosis. It suggests that the norms and attitudes of individuals could affect these factors or practices. In addition to zoonotic awareness, other factors such as agro-ecological activities of the household, number of individuals in the household and types of livestock species raised were recognized to have association with different household practices in this result. The respondents with higher number of family members and with large numbers of chickens were more likely to carry out slaughtering while higher daily collection of manure is practiced in respondents who have higher number of cattle. The key factor for food security and nutrition in rural surroundings is livestock management. However, the health of humans and livestock productivity are negatively affected by low control measures of zoonotic diseases.[13,14] To alleviate the risks and have good control measures, characterizing livestock production, such as the aim of livestock production and the role of gender should be recognized. In this study, it is also observed that donkey and horse are mainly used for the production of draught power while poultry are often used for family consumption. Sheep, goat, and cattle were also reared mainly for sale. Though in other studies it is reported that the decisions regarding household practices are not evenly distributed between men and women,[15] in this study, women's main responsibility was for farm animals such as poultry and cattle while men and children took the main responsibility for horses and handling of many species, respectively, which is a common practice in developing countries with low income.[16]

Conclusion

This study shows that the majority of people in this study area have minimal knowledge about zoonotic diseases which could extremely affect their health and the health of their families. Associations between household practices and zoonosis exposure were also common and gender difference was one of the main influencing factors. Therefore, based on this result it can be recommended that: there should be joint work between medical and veterinary professions to plan actual awareness creation about zoonotic disease transmission, prevention and control; awareness creation for the public about household practices related to zoonosis is also obligatory to minimize its risk and primarily attention to gender difference should

be considered for successful implementation in the advancement of a zoonotic management program. Furthermore, intervention should be focused towards specific target groups depending on types of livestock species and their role to livelihoods.

Ethical Clearance

University of Gondar ethical review board gives ethical approval for human subjects. This study was conducted in accordance with the declaration of Helsinki. Verbal informed consent is approved by University of Gondar Institutional Review Board following this declaration. Before the beginning of the study participants and/or their relatives were informed about the procedures and significance of the research and oral informed agreement was gained from each participant. All data and the result of analysis were also kept confidential and were only communicated to concerned bodies. Moreover, participants who were not volunteers were not forced to be included as study subjects and participants were informed that they could refuse participation in the study at any point of the study stage.

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Disclosure

All authors affirm that there is no conflicts of interest in this work.

References

1. Hundal JS, Sodhi SS, Gupta A, et al. Awareness, knowledge, and risks of zoonotic diseases among livestock farmers in Punjab. *Vet World*. 2016;9(2):186. doi:10.14202/vetworld.2016.186-191
2. Osbjer K, Boqvist S, Sokerya S, et al. Household practices related to disease transmission between animals and humans in rural Cambodia. *BMC Public Health*. 2015;15(1):476. doi:10.1186/s12889-015-1811-5
3. Cascio A, Bosilkovsk IM, Rodriguez-Morales A, et al. The socio-ecology of zoonotic infections. *Clinical Microbiol Infect*. 2011;17(3):336–342. doi:10.1111/j.1469-0691.2010.03451.x
4. Torgerson PR, Macpherson CN. The socioeconomic burden of parasitic zoonoses: global trends. *Vet Parasitol*. 2011;182(1):79–95. doi:10.1016/j.vetpar.2011.07.017
5. Molyneux D, Hallaj Z, Keusch GT. Zoonoses and marginalised infectious diseases of poverty: where do we stand? *Parasit Vectors*. 2011;4(1):106. doi:10.1186/1756-3305-4-106
6. Lowenstein C, Waters WF, Roess A, et al. Animal husbandry practices and perceptions of zoonotic infectious disease risks among livestock keepers in a rural parish of Quito, Ecuador. *Am J Trop Med Hyg*. 2016;95(6):1450–1458. doi:10.4269/ajtmh.16-0485
7. NMA. *Annual Climatical Bulletin for the Year 2011*. National Meteorological Agency of Ethiopia; 2011.
8. Gondar Zuria Development Agriculture office District. Annual report. Maksenyit; 2013.
9. Digafe RT, Kifelew LG, Mechesso AF. Knowledge, attitudes and practices towards rabies: questionnaire survey in rural household heads of Gondar Zuria District, Ethiopia. *BMC Res Notes*. 2015;8(400). doi:10.1186/s13104-015-1357-8
10. Thrusfield M. *Veterinary Epidemiology*. 3rd ed. London: Black well science Ltd, UK; 2005:229–245.
11. Ali A, Yimer EA, Sifer D. A study on knowledge, attitude and practice of rabies among residents in Addis Ababa, Ethiopia. *Ethiop Vet J*. 2013;17(2):19–35. doi:10.4314/evj.v17i2.2
12. Nigatu Y, Tilahun B, Moa M. Assessment of public knowledge, attitude and practices towards rabies in Debark Woreda, North Gondar, Ethiopia. *J Vet Med Anim Health*. 2016;8(11):183–192.
13. Conan A, Ponsich A, Luce Goutard F, et al. Community-based education trial to improve backyard poultry biosecurity in rural Cambodia. *Acta Trop*. 2013;125(3):294–302. doi:10.1016/j.actatropica.2012.12.006
14. Randolph T, Schelling E, Grace D, et al. Invited review role of livestock in human nutrition and health for poverty reduction in developing countries. *J Anim Sci*. 2007;85(11):788–800. doi:10.2527/jas.2007-0467
15. Hickler B. *Between HPAI "Awareness" and Practice in Camboida. Recommendations from an Anthropological Participatory Assesment. FAO Participatory Learning Communications Specialist/Medical Anthropologist*. 2007.
16. Mupawaenda AC, Chawatama S, Muvavarirwa P. Gender issues in livestock production: a case study of Zimbabwe. *Trop Anim Health Prod*. 2009;41(7):1017–1021. doi:10.1007/s11250-008-9268-5