

Participatory Survey on Zoonotic Diseases Affecting Livestock Keeping Communities in Tanzania

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Abstract: The study was carried out to assess community awareness, perceptions, knowledge and attitude to zoonoses in various livestock production systems in Arusha and Iringa regions in Tanzania. Open-ended questionnaires, focus group discussions and matrix ranking techniques were employed. Nineteen diseases considered to be zoonoses were reported by respondents with rabies, tuberculosis, anthrax and brucellosis ranked as the top four diseases in pastoral, agro-pastoral and smallholder dairy farming systems. Respondents from all villages reported rabies as the major problem in all localities. Eighty percent of respondents thought tuberculosis and anthrax being a problem whereas, 74% thought brucellosis was a major problem. Foot and mouth disease (FMD) was reported to be the major problem by respondents in Masaai pastoralist communities. Of the conditions, 37% were actually not zoonotic eg. malaria, East Coast Fever (ECF), mastitis, allergies, typhoid fever, trachoma and cancer. Fifty three percent of respondents thought that tuberculosis, brucellosis and anthrax were difficult to diagnose clinically in animals. Rabies in humans was reported by respondents to be characterised by madness, barking, and death whereas, emaciation, coughing, recurrent fever, weakness and adenitis manifested tuberculosis. Clinical signs reported for brucellosis were recurrent fever, joint pains, miscarriages and diarrhoea. Many respondents reported cutaneous lesions, diarrhoea, vomiting and deaths as major clinical features of anthrax in humans. Foot and Mouth Disease in humans was reported to be characterised by fever, flue, diarrhoea, headache, coughing and miscarriage. Ninety three percent of the respondents thought that 63% of all conditions are transmitted to humans via ingestion of animal products whereas, 37% thought via direct contact, aerosols and bites. All respondents in the masaai pastoral communities thought blood was still consumed in the majority of households. Seventy five percent of respondents from agro-pastoral communities thought that raw blood was still consumed by some communities in the study area. In the smallholder dairy sector, 29% of respondents cooked blood and prepared blood meal for their animals while, 70% of the respondents left unused. Eating cooked meat was common in all farming systems. When milk was plenty boiling prior drinking was not uncommon in pastoral societies. Ninety percent of milking and manure handling performed by women in both pastoral and agro-pastoral communities while all family members were involved in the smallholder dairy households. Slaughtering weak, sick or small ruminants and preparation of full term aborted fetuses for human consumption were done by women in pastoral households. Low awareness and poor knowledge of zoonoses combined with food consumption habits and poor animal husbandry in pastoral and agro-pastoral communities is likely to expose them to an increased risk of contracting zoonoses. Public health promotion on education may be useful in pastoral and agro-pastoral communities to improve awareness of important zoonoses in Tanzania.

Key words: Participatory rural appraisal, zoonoses, farming systems and awareness

Introduction

Animal and human health are inextricably linked. People depend on animals for nutrition, socio-economic development and companionship, yet animals can transmit many different diseases to humans. Diseases transmitted from animals to humans are termed zoonoses and some of them are potentially devastating. According to WHO, (1959), zoonoses are defined as diseases and

infections which are naturally transmitted between vertebrate animals and man. However, Palmer *et al.* (1998) challenged the WHO definition by saying that not all conditions are naturally transmitted. Such conditions include unnatural opportunistic infections of severely immunocompromised patients, xenotransplantation and intoxications. For people who are highly dependent on

livestock, livestock diseases, water, feed supply and insecurity usually feature as important concerns. Livestock diseases that cause significant loss in terms of production and reproduction, and pose a threat to public health include tuberculosis, anthrax, rabies and brucellosis. Livestock keepers can express their views on diseases through Participatory approaches (Kirsopp-Reed, 1994), a methodology that helps to identify community livelihoods, resources, problems, opportunities and socio-economic conditions (Selener, *et al.*, 1999).

The Participatory Rural Appraisal (PRA) methodology has gained more popular acceptance than Rapid Rural Appraisal (RRA) as local people take the active role rather than researchers or outsiders (Selener *et al.*; 1999). PRA explores several techniques to gather information such as semi-structured questionnaires, focus-group discussions, matrix ranking and scoring and open-ended questionnaires. However, PRA has some limitation, in the sense that some information generated may be unsuitable for statistical analysis due to lack of randomisation (Franzel and Crawford, 1987).

During the initial phase of the Brucellosis project, information on zoonotic diseases was gathered from animal keeping communities in Tanzania using PRA methodologies. The rationale was to establish community awareness, local perceptions, knowledge and attitudes on zoonoses from various livestock production systems.

Materials and Methods

The study area: The study was carried out in two regions of Arusha and Iringa, Tanzania. Arusha region is located in the northern part of Tanzania bordering Kenya, Kilimanjaro region, Tanga, Shinyanga, Singida, Mara, Dodoma and Morogoro regions. Iringa region is located in the southern highlands bordering Mbeya, Morogoro and Dodoma regions. Villages selected were located between 2°03'17. 7" to 8°00'31"S and 35°20'54" to 36°02'31"E respectively. The study was carried out between October 2001 and March 2002.

Village selection: Animal keeping villages were selected for convenience based on anticipated co-operation from village leaders. Four districts were involved in the study namely; Ngorongoro, Babati, Karatu (Arusha region), and Iringa rural (Iringa region). Three different management systems; pastoral, agro-pastoral and

smallholder dairy systems were selected for the purpose of this study. Three pastoral (Enguserosambu, Wasso and Olorien), six agro-pastorals (Bermi, Bagara, Gidamar, Managhats, Endallah and Mbuga nyekundu) and six-smallholder dairy keeping villages (Mkimbizi, Kilolo, Tanangozi, Ihimbo, Lulanzi and Ilula) were visited during the survey.

Participatory rural appraisal team: The number of individuals in the team varied from 2-5 depending on locality. However, at any one time a project team member, one host from the district livestock offices and, where possible, the village livestock extension officer formed the team. These people acted as facilitators for the PRA work in each village visited.

Before the actual survey was conducted, visits were made in each village to explain the aims of the study and criteria used for selecting participants to the village leaders. Village leaders were asked to select two people from each subvillage (kitongoji). The village leaders were asked to arrange a date, time and venue for meeting at their convenience.

Questionnaires: Open-ended questionnaires were conducted in fifteen villages using the local tribal language or the national language (Kiswahili), depending on the composition of the group. This technique was used to gather information on zoonotic diseases prevailing in the community, the clinical signs of each disease in animals and humans, routes of transmission from animals to human, family activities and consumption habits of animal products. Responses of participants were jotted down in a notebook by team members without interfering with the discussion and interviewers only intervened when clarification was required.

Matrix Ranking and Scoring: The technique was applied in two villages namely Mbuga nyekundu and Endallah, both in Karatu district. Eighteen people were enrolled in the exercise (thirteen from Endallah and five from Mbuga nyekundu). They were asked to list zoonotic conditions thought to be present in their community. Each respondent was given ten groundnuts for disease ranking. Following this, they were asked to rank diseases using groundnuts based on severity. Each disease was assigned a small box where nuts were dropped. The more important a particular disease, the pile of nuts assigned to it. Respondents were prompted to check their scoring and confirm that as a group. To establish awareness and knowledge of clinical signs to

each disease in animals and humans the disease-signs matrix was developed using a flip chart. Diseases were placed in the columns and signs in the rows respectively. Whenever possible local language was used to facilitate the exercise. In each corresponding disease-sign box respondents were asked to put nuts if thought the clinical sign was related to the disease in animals. The same principal was used for disease-sign matrix in humans. When all the diseases and disease-signs had been scored, the results were recorded.

Results

Respondents and Villages: Participants involved in the study were 192 from 15 animal keeping villages. Forty two percent (81/192) of the respondents were women and 58% (111/192) were men (Fig. 1).

Zoonoses: Nineteen zoonoses were reported by villagers in the survey areas (Table 1). Rabies, tuberculosis, anthrax and brucellosis were ranked the top four major zoonotic diseases reported in all farming systems. On the other hand Foot and Mouth Disease (FMD) was picked as an important zoonoses in pastoral communities.

All fifteen villages visited in the study area have reported rabies as a problem in their localities. Tuberculosis and anthrax were both reported by twelve (80%) villages whereas brucellosis was reported in eleven (74%) villages. Foot and Mouth Disease was ranked as an important disease in pastoral villages. None of respondents in pastoral and agropastoral villages have reported cysticercosis, allergies, ECF, trachoma, mastitis, orf and cancer as zoonoses. However, 37% of the conditions reported as zoonoses were actually not.

Clinical Signs in Animals and Humans:

According to respondents, domestic animals contract one or more of these diseases. Other diseases involved wild animals like rabies (wild dogs and hyena) and plague (wild rats). The clinical signs of brucellosis, anthrax, tuberculosis, tetanus, and tapeworms in animals were not easy to be diagnosed by the respondents. Fifty three percent of respondents reported that brucellosis, anthrax and tuberculosis were difficult to diagnose clinically in animals.

Of the respondents reported anthrax, three villages (3/12) have reported rigor mortis, blood oozing, tympany and sudden death as clinical features for anthrax in animals. Mange and orf were characterised by skin lesions. Foot and

Mouth Disease in animals was reported by respondents to be characterised by salivation, lameness and lesions on the mouth, muzzle and interdigital spaces. Emaciation, diarrhoea and unthriftiness were the signs reported for tapeworm infestation.

Rabies in humans was reported by respondents to be characterised by madness, barking, and death whereas, emaciation, coughing, recurrent fever, weakness and adenitis manifested tuberculosis. Clinical signs reported for brucellosis were recurrent fever, joint pains, miscarriages and diarrhoea. Many respondents reported cutaneous lesions, diarrhoea, vomiting and deaths as major clinical features of anthrax in humans. Other conditions reported with clinical signs were FMD (fever, flue, diarrhoea, headache, coughing, miscarriages), tetanus (fever, tremors), worms (segments seen in faeces), ECF (stomach disturbance), plague (high fever, death), trachoma (eye problems), allergies (dyspnoea), mastitis (fever, mastitis), typhoid fever (fever, headache, weakness), cancer (cancer) and typhus fever (high fever, malaise).

Routes of Transmission: Ninety three percent of the respondents thought 63% (12/19) of all conditions are transmitted to humans through ingestion of animal products, including consumption of raw milk, blood and meat. The remaining 37% are transmitted via other routes such as direct contact, inhalation and bites.

Family Activities: Among the five household activities assessed, (milking, herding, assistance during calving, handling manure and slaughter), 90% of milking and manure handling performed by women in both pastoral and agro-pastoral communities. Children also helped when additional assistance was required. During the calving periods adults tended to assist.

In all farming systems men were responsible for slaughtering. However, in pastoral communities women were responsible for slaughtering small ruminants and weak or sick ones. In the smallholder dairy households family members are involved to all livestock activities. If they were employed, and children went to school, an animal attendant was employed to care for animals. In the case of calving, men or nearby veterinarian/experienced person were generally called to assist.

Consumption Habits of Animal Products: Boiling of milk in the pastoral communities was uncommon especially during rainy season when milk was plentiful. Sometimes while herding,

Table 1: Ranking of opinion on important zoonotic diseases by villages in different farming systems in Arusha and Iringa regions from October, 2001 to March, 2003

Diseases	Pastoral (3 villages)	Agropastoral (6 villages)	Smallholder dairy (6 villages)	Overall response (15 villages)
Rabies	3	6	6	15
Tuberculosis	2	5	5	12
Anthrax	3	3	6	12
Brucellosis	3	5	3	11
Tape worms	1	3	3	7
Plague	0	1	2	3
FMD	3	0	0	3
Mange	1	0	2	3
Typhus fever	0	2	0	2
Cysticercosis	0	0	2	2
Malaria	1	0	0	1
Allergies	0	0	1	1
ECF	0	0	1	1
Trachoma	0	0	1	1
Mastitis	0	0	1	1
Orf	0	0	1	1
Tetanus	0	1	0	1
Typhoid fever	0	1	0	1
Cancer	0	0	1	1

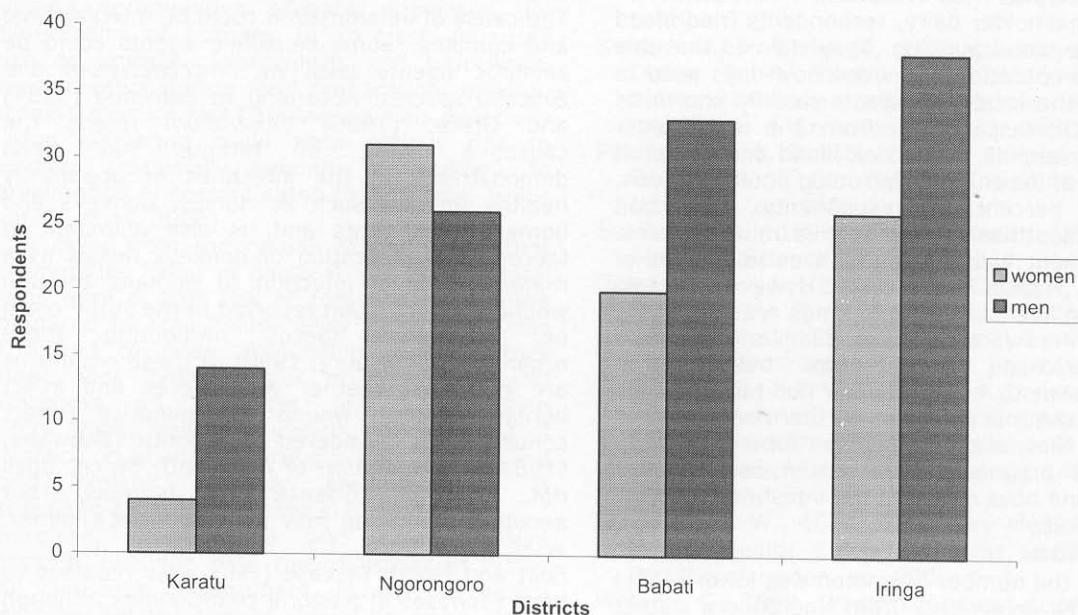


Fig. 1: Gender of respondents in PRA

children were known to suckle directly from docile lactating cows. About 80% of the respondents in the agro-pastoral areas claimed to boil milk. Many respondents felt that many households do not boil soured milk for several reasons including reduction on butter content and change of flavour. In the smallholder dairy households, milk destined for home consumption was boiled and that for sale was left unboiled.

In pastoral Maasai communities blood was consumed when animals were slaughtered at their premises. Furthermore, during famine or when a woman delivered, blood was obtained from the jugular vein of a live animal using special arrow. Villagers bled healthy animals thought to be free from disease. Blood was mixed with either milk or hot soup and consumed. Agro-pastoralists have three different methods of preparing blood before consumption. The first preparation was raw blood mixed with duodenal content, meat chops and bile (locally known as *khansay-Iraqew word*). Seventy five percent of the respondents in the area agreed that *khansay* was still taken by some community members. The second preparation was raw blood mixed with hot soup, and the third preparation was fried blood.

In the smallholder dairy, respondents fried blood and make blood pudding. They claimed that this kind of preparation was even now-days used in some of the local restaurants (locally known as *boms*). Of respondents from the smallholder dairy households, 29% cook blood and prepared blood meal for animals, including poultry rations. Seventy percent of respondents left blood unused. Meat was cooked in all farming systems. Usually meat was cooked with certain types of herbs in Maasai pastoralists. However, certain offal's like liver, kidney and lungs are often eaten while still raw. Meat from cadavers was also eaten because the Maasai believe that transmission to humans does not happen once animals die of disease. Furthermore, it was believed that, aborted fetuses from animals in advanced pregnancy were eaten cooked after women and boys removed the intestines.

Discussion

Although the number of women was lower (42%) than males, experience from Ngorongoro district has shown that using PRA in a group of women without men enabled them to be free, open and volunteered to share in detailed manner on the subject matter provided consent was reached. This gave an insight on how to carry out a successful PRA in areas where men are dominant talker.

In all farming systems, the most important zoonotic diseases reported were those causing greatest loss in animals in terms of mortality and morbidity and posing a threat to public health. These included rabies, anthrax, tuberculosis and brucellosis. These conditions are potentially devastating and impaired production and reproduction in livestock, and danger to health of the human population. Awareness of the clinical signs of these diseases in livestock was very limited among respondents. This poses another hazards to livestock keepers who are always in contact with health and infected animals without aware of the precaution measures.

From the list of zoonoses proposed by respondents several conditions did not fulfill the criteria for classification as zoonotic according to WHO (1957). Such conditions included malaria, East Coast Fever (ECF), mastitis, allergies, typhoid fever, trachoma and cancer. Malaria has been reported in the pastoral communities and its high occurrence was linked with drinking plenty of milk during rainy season. This association may result from the fact that during rainy season malaria is common and may result from many mosquitoes being present. Mastitis is a general term referring to udder inflammation. The cause of inflammation could be multifactorial and complex. Some causative agents could be zoonotic agents such as *Mycobacterium* and *Brucella species*. According to Schwabe (1984) and Grace, (1986) *Clostridium tetani*, the causative agent of tetanus has been demonstrated in the intestines of apparently healthy animals such as horses, donkeys and domestic ruminants and, is also abundant in faeces. The implication of donkeys faeces as a major source of infection to humans through wound contamination reported in the study could be considered faeces harbouring these organisms (Sainsbury, 1998). If these organisms are excreted together with faeces and infect humans through wound contamination (direct contact), this considered as zoonotic (Schwabe, (1984). Consumption of meat with cancer does not transmit disease to humans, but xenotransplantation may pose a threat (Palmer, *et al.*, 1998).

Foot and Mouth Disease (FMD) was reported to be a zoonoses in pastoral communities although FMD was reported as not zoonotic by Schrijver *et al.*, (1999). However, several reports showed no doubt remains that FMD is a zoonosis (Schwabe, 1984; Geoffrey, 1988; Bauer, 1997). This has to be differentiated from infections caused by Coxsackie A group, herpes simplex and sometimes vesicular stomatitis by isolation and

typing because they can appear similar clinically (Bauer, 1997; Schriver *et al.*, 1999). Humans with FMD were thought to show signs related to FMD in livestock including vesicles in the mouth, or on the hands and feet (Bauer, 1997). Contrary, in the study area coughing, fever, flue and miscarriages in adults were reported by respondents. These were not consistent with classical FMD signs (dryness of the mouth, vesicles in the mouth, lips, tongue, hands, and feet) reported elsewhere (Gracey, 1986; Bauer, 1999). Children showed diarrhoea, flue and high fever. However, the severity of the disease in children reported by respondents in the study area was consistent with the study done by Geoffrey (1988) where infection in children was more severe than that observed in adults.

Of all the diseases reported, 63% thought to be transmitted by consumption of animal products. This means that the principal route of transmission from animals to humans is likely to be through ingestion of infected animal products. Although meat was usually cooked; milk, milk products, offals and blood were still consumed raw or half cooked in several households. Consumption of animals that had died of infectious diseases and aborted fetuses in pastoral communities probably increases the vulnerability of humans to contract zoonoses such as anthrax, tuberculosis and brucellosis. Direct contact during food preparation, milking, cleaning manure and handling animals especially during delivering could pose serious risk to handlers (especially women) in addition to consumption of contaminated food (Grace, 1986; Kumar, *et al.*, 2000).

It is likely from the results of this study that communities living in pastoral and agropastoral areas were at high risk of contracting zoonoses compared to smallholder dairy areas. This was attributed to close association with livestock under poor hygiene, lack of knowledge and awareness on zoonoses and consumption habits. Public health education, improvement of livestock husbandry through vaccination and good hygienic condition are important in controlling zoonotic diseases in humans.

Therefore, collaborative and comprehensive research involving both the ministries of Water and Livestock development, Ministry of health and other related sectors should be emphasised. This is important because some zoonotic diseases, which are rare/absent or considered of no public health importance could be devastating in our communities, if not now, in the near future. Establishment of zoonotic unit under the Ministry of Health involved both medical,

veterinarians and other experts may be a way forward.

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