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ORIGINAL RESEARCH

Factors associated with milk producer's awareness and practices in relation to zoonoses in northern Malawi

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Abstract

Background: Many diseases are known to be naturally transmissible between vertebrate animals, including cattle and humans. Currently, much effort is being made to promote dairy farming in Malawi but there is limited information about zoonotic diseases including public awareness and practices. This study was designed to determine factors associated with dairy producer's awareness and practices with regard to zoonoses in Northern Region of Malawi.

Materials and Methods: A structured questionnaire was used to collect information from 140 randomly selected dairy producers between January and June 2011. Level of awareness and practices with respect to zoonotic infections was evaluated using a score ranging from 0 to 11. Chi-squared test followed by a multivariable logistic model were used to assess potential factors associated farmer's awareness and practices.

Results: Awareness and practice level was unsatisfactory. Significantly higher number of respondents (75.7 vs. 32.9%,χ^2 = 51.81, df =1, $p< 0.001$) had satisfactory level of awareness when compared to those who practiced preventive measures. Awareness of the existence of zoonotic infections and practices was higher in farmers who acquired animals through loan (p = 0.008), farmers with above primary education (p = 0.002) and farmers with more than six years of dairy farming experience (p = 0.010). Most farmers (59.3%) received information about zoonoses through Agricultural extension services.

Conclusion: Awareness and practices with respect to zoonotic infections was dependent on farmer's formal educational level, dairy farming experience and means of acquiring parent stock. Regular disease surveillance and promotion of education on the risk associated with zoonotic infections through dairy extension and medical services should result in increased awareness and efficient control of zoonoses in Malawi.

Keywords: knowledge, Malawi, prevention practices, zoonoses

Introduction

Zoonoses are still a major challenge to human health worldwide. In Africa, it is estimated that infectious diseases account for up to 68% of all deaths especially in vulnerable groups such as children and people infected with HIV/AIDS [1]. Sixty-one per cent of the 1,415 species of infectious agents reported to cause disease in humans are naturally transmissible from vertebrate animals to humans and vice-versa [2]. Despite their importance, most zoonotic infections go undiagnosed, causing enormous suffering and death of thousands of children and adults daily [3-7].

While zoonotic infections remain age-long, many factors including increase contact between animals and humans continue to play a key role in their emergence and persistence. Environmental changes, customs and traditions, increase in human population, rural to urban migration as well as increase movement of animals are some of the reasons for increased contact between Man and animals. As such, animals do not only serve as a reservoir for infectious agents but also a means of introducing new infectious agents into the human population. In sub-Saharan Africa, farming practices, low educational level, culture and eating habit, presence of reservoir population, increase movement of animal, inadequate disease control programs and lack of information about disease burden have been reported to be associated with the persistence of zoonotic diseases [5,8-12].

Though information about zoonotic disease burden in animals and humans in most African countries including Malawi remains scarce [13], reports have demonstrated their existence [4,6,14-17]. In Malawi, reported cases of human infection with zoonotic diseases include rabies and cryptosporidium [6,14,18] while bovine tuberculosis, brucellosis, rabies and cryptosporidiosis have also been reported in animals [6,10,14,19,20]. Amongst these, only rabies is being given considerable attention though insufficient funds, lack of information on the disease burden as well diagnostic facilities continue to be a major setback in the management of the disease control programs [6,8]. Direct contact with infected tissues or animals and oral transmission (mainly contaminated food from animal origin) have been earmarked are most important means of animal to human transmission zoonoses [7,8,12,15]. Considering that most disease control schemes including compensation paid to livestock producers for infected animals that are culled is not very feasible in most developing countries mainly because of limited

Table-1. Core questions on awareness and practices with regard to zoonoses

	Awareness
1	To your knowledge, are there diseases that are naturally transmitted between animals and humans?
2	If yes, please name any zoonotic disease (s).*
3	Name any means of transmission of zoonotic disease (s).*
	Practices
	Personal habit practices
4	Do you not sometimes consume raw or cultured milk in your household?
5	Do you sell milk only to the farmer organisation?
	Veterinary service seeking practices
6	Have you had your herd tested for any zoonotic disease?
7	Have you had your herd vaccinated for any zoonotic disease?
	Medical service seeking practices
8	Have you or a family member seek medical consult regarding any zoonotic disease when sick?

* Guidelines for scoring awareness and practices of respondents regarding zoonoses in Table-2 were used

Table-2. Guidelines for scoring knowledge and practices of respondents regarding zoonoses*

Knowledge category	score	Guide
Poor	0	Farmer has no idea or gave completely wrong answers
Partial	1	Respondents named correct and wrong zoonotic diseases or means of transmission
Fully correct	2	Respondents named at least one correct zoonotic disease or means of transmission

*Adapted from [23]

resources, improving animal owners' awareness and disease identification skills could optimise their prevention and control. Hence, an understanding of farmers' awareness and practices which has received much attention recently [5, 11, 21-24] could be a useful tool in developing and improving existing control measures. To the authors' knowledge, no reports into factors associated with livestock producers' awareness and practices associated with zoonotic diseases has been documented in Malawi.

The objective of this study was to determine factors that could influence dairy producers' awareness and practices with regard to zoonoses in the Northern Region of Malawi.

Methodology

Study area and population: This study was carried out around Mzuzu, the capital city of the Northern Region of Malawi between January and June 2011. This region has estimated at 1,067,084 inhabitants and experiences the highest annual population growth rate (3.3%) in the country [25]. The region also has the highest number of imported dairy cattle in the country. More than 90% of the dairy cattle population in this region are located around Mzuzu [26-28]. At the time the study was carried out, there were 684 registered farmers owning an average of two animals each in the study area. Dairy cattle breeds kept are predominantly Holstein-Friesians, Jerseys and their crosses with the indigenous Malawi Zebu. These animals are mainly stall-fed or grazed on communal pasture land near human dwellings [10,27,28]. A total of 140 (20.5%) were randomly selected were included in the study.

Questionnaire survey: A structured questionnaire which covered demographic characteristic, awareness and preventive measures against zoonotic diseases was used to collect data. The purpose of the study as well as methodology was explained to the farmers and their oral consent was obtained before enrolment in the study. The first section of the questionnaire covered demographic information including respondents' location, gender, age, experience in dairy farming, and education level. The second section contained 8 core questions: 3 for awareness of the existence of zoonoses and 5 for practice associated with preventing zoonoses (Table-1). Most of the questions were closed-ended questions and answers were assigned pre-existing set of answers (Yes/Not sure/ No). A maximum of 2 points were assigned to question 1 if the answer was “yes”; 1 point if answer was “not sure” and 0 points if answer was “no”. For questions 2 and 3, the response was assigned points ranging from 0 to 2 points as described in Table-2. Regarding the questions on practices associated with preventing zoonotic diseases, a score of 1 point was assigned if the answer was “Yes” or 0 point if the answer was “Not sure” or “No”. In total, 6 and 5 points were used to assess respondents' level of awareness and prevention practices related to zoonotic disease, respectively. Respondents with at least 4 and 3 points were considered to have satisfactory awareness level and practice a satisfactory level of zoonotic disease prevention, respectively. In order to be considered to have an overall satisfactory awareness as well as zoonotic disease prevention practices, a participant had to attain a score of at least 7 out of the total of 11points.

Statistical analysis: Data obtained was entered into Microsoft excel. They were analysed using SPSS (version 12.0; spss Inc., Chicago IL,USA). Unconditional association between potential farmers demographic factors were assessed using the chi-square test. The response variable was “satisfactory” if the farmer has a score of at least 4, 3 and 7 for awareness, practices and overall assessment, respectively and “unsatisfactory”

Table-3. Final multivariable logistic regression model for factors associated with respondent's awareness and practices zoonotic diseases

Variable	n	coefficients	Std. Error	t value	OR	95% CI	P-value of category
Means of acquisition parent stock							
Personal resources	38	1.0 (reference)					
loan	102	1.2	0.5	2.7	3.3	1.4– 8.0	0.008
Education level							
Below primary school	100	1.0 (reference)					
Above primary school	40	1.3	0.5	3.0	3.5	1.6– 7.9	0.002
Duration in Dairy farming							
Less than 6 years	81	1.0 (reference)					
More than 6 years		1.9	0.4	5.3	2.7	1.3– 5.6	0.010

Hosmer-Lemeshow test results: χ^2 = 3.868, df = 5, p= 0.569

Table-4. Source of information about zoonotic diseases

Source*	Number of respondents (%)
Extension workers	83 (59.3)
Medical officers	24 (17.1)
Formal education (schools)	17 (12.1)
Other farmers	13 (9.3)
Others **	6 (4.3)

* Multiple sources where reported by participants;
**Others = radio programs, books, milk buyers, personal intuition

if otherwise. Variables with a p-value of less than 0.25 were included in multivariable logistic model with a significance level of 10%. Variables with the highest p-values were removed beginning with the highest p-value in each step and the regression was re-run. In the final stage, the significance level was lowered to 5% and any factor with p value greater than or equal to 0.05 was removed. The goodness of fit of the final model was assessed using the Hosmer-Lomeshow statistic option.

Results

Characteristics of study population: Sixty per cent of the farms included in the study were owned by women. The mean age of participants was 47.5 ± 13.8 years and the dairy farming experience was 7.5 ± 5.8 years. A majority of the respondents acquired parent stock through donations (72.9%) and had below primary school education level (71.4%).

Awareness, practices and source of information about zoonotic diseases: The overall awareness level of dairy farmers was unsatisfactory with the average score for awareness, practices and overall score of 4.6 ± 2.1, 2.0 ± 1.1 and 6.6±2.4 respectively. Significantly more respondents (75.7 vs. 32.9%, χ^2=51.81, df = 1, *p< 0.001*) had satisfactory awareness level when compared to those who implemented prevention measures. The proportion of respondents with satisfactory awareness level was higher (94.1 vs. 61.7%, χ^2=18.68, df = 1, *p<0.001*) in respondents with above six years of dairy farming experience. Similarly, more farmers (52.5 vs. 25.0 %, χ^2=8.59, df = 1, p = 0.003) with above primary education level reported to practice measure that prevent zoonotic disease transmission.

On the overall, farmers' level of knowledge and practices was significantly influenced (*p<0.05*) by their means of acquiring dairy animals, educational level and duration in dairy farming in the final multivariable analyses (Table-3). More than half of the respondents received information about zoonotic diseases from agricultural extension workers. Other important sources of information include medical officers and throgh format education (Table-4).

Discussion

Results of this study show that smallholder dairy farms ownership in the northern region of Malawi is dominated by women. This is contrary to reports from other dairy farming communities such as the centre region of Malawi and Zimbabwe [24,29] and reflects the presence of donor organisations in the study area. These organisations use dairy farming as means to ensure food security give priority to women as well as the under privileged in the communities [30].

Many zoonotic infections can be eliminated or reduced using basic measure such as adequate hygiene and animal husbandry practices. In order for the prevention of zoonotic infections to be effective, animal owners and those who are in contact animal must be aware of these risks and their health behaviours or practices should play a key role in reducing the risk of transmission. However, recent studies have revealed poor knowledge of livestock owners, medical practitioners as well as the existence of eating habits continue to predispose humans to zoonotic infections [5,9,12, 17].

The risk of exposure to zoonotic diseases has been reported to be influenced by animal owners' knowledge, attitude, and practices [5,12,15,17]. In this study, the awareness and prevention practices related to zoonotic diseases were comparable to that observed in smallholder dairy farms in Egypt, Tanzania and Zimbabwe [11,22,24]. However, more farmers had

satisfactory awareness level but preventive practices against zoonotic diseases were rarely reported. This difference may be due to failure to perceive the risk or to identify zoonotic diseases. Like in most African countries where more than 70% of total milk produced is sold through informal markets or is consumed on the farm without being pasteurised [31], most of the farmers in the study area processed milk into cultured milk "Chambiko". Given this, the risk of exposure to milk borne zoonoses is apparent.

In addition, regular testing dairy animals for zoonotic diseases was not a common practice at the time this study was carried out. More than 80% of the farms had not been checked previously for a zoonotic disease since they were established. Further, little information on zoonotic disease burden in animal and human population was available [8,10]. This lack of information could have contributed to the low zoonotic disease prevention practices recorded in this study. Similar observations were made in neighbouring Tanzania where low level of awareness of zoonoses in addition to food consumption habits is thought to increase the risk of exposure of livestock keepers to zoonotic infections [11].

Overall score for awareness and practices with respect to zoonotic diseases was not satisfactory but differed significantly between respondent's educational level, experience and means of acquisition of parent stock for their farms. Though farmers with above primary educational level made up a minority of respondents in the current study, the odds of these farmers were over than 3 times higher than that of farmers with below primary education. This observation reflects the source of information about zoonotic diseases where both non formal education through extension workers and formal education were mentioned as important source of information on zoonoses.

In the current study, most respondents acquired animals through loans from Non-Governmental organisations. These organisations usually include basic training on dairy management and health in their activities [30]. The training provided might have contributed to the higher proportion of respondent with satisfactory knowledge and practice level observed in this group of respondents. Nonetheless, further training including education on zoonotic infections will be very valuable especially to milk producers who establish dairy farms using personal resources.

Conclusions

Milk production in Malawi is expected to increase to meet up with the rapid population growth and urbanisation. Besides the beneficial effect of the current policies which are meant to encourage importation and dissemination of dairy animals as well as technology in the country, the risk of milk-borne zoonoses cannot be underestimated. Considering financial and logistic bottle neck involved in implementing disease control programs in most developing countries, improving livestock producers' awareness and disease identification skills could optimise disease control. The current study shows that milk producers had satisfactory knowledge of zoonotic diseases but prevention measures were rarely implemented. Regular testing of cattle for zoonotic diseases as well continuous training as well as improvement in dairy extension system would be necessary for the control and prevention zoonotic diseases in Malawi.

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Competing interests

Author declare that he has no competing interest.

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