Bovine zoonoses in Cameroon’s West region: Knowledge, attitudes, and practices of herdsmen

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Abstract

Background and Aim: Shepherds are in constant contact with animals, and they are potential hosts for the transmission of zoonoses. This study aimed to assess the perceptions of shepherds in Cameroon’s West region regarding zoonotic diseases.

Materials and Methods: A cross-sectional study was conducted from August to October 2017, on 218 shepherds. The data were collected using semi-structured interviewer-administered questionnaires. The participants were assessed on their knowledge, attitudes, and practices that might expose them to bovine zoonose transmission, and the data were analyzed with R, version 2.13.0. Descriptive statistics were generated, and the association between socio-demographic characteristics and knowledge was explored using the Chi-square test.

Results: Out of the 218 herdsmen, (205/218) 94% did not have any education, and (195/218) 89.5% did not know the definition of zoonosis. There was a correlation between the level of education and knowledge of the definition of zoonosis: About (162/218) 74.6% cited tuberculosis as a zoonosis, (62/218) 28.4% said the main modes of transmission were by ingestion of contaminated milk, and (66/218) 30.3% by consumption of contaminated meat. Abortions during the third trimester of gestation, combined with the presence of hygroma, were described by (130/218) 59.6% of the participants as brucellosis symptoms. In terms of practices and attitudes, (187/218) 85.8% and (50.14/218) 23.0% of the participants confirmed that they consumed raw milk and raw meat, respectively. Almost all (214/218) 98.1% interviewees stated that blood consumption is forbidden. In case of suspicion of disease, (204/218) 93.6% maintained that they treated sick animals.

Conclusion: The level of knowledge about zoonotic diseases was low; a high percentage of shepherds followed inadequate hygiene practices and expressed concern about zoonoses. As a result, they are at risk of exposure to pathogens. It would be in the interest of public health to develop training programs for shepherds and livestock owners to mitigate zoonotic risks.

Keywords: knowledge, attitudes, and practices survey, shepherds, West region of Cameroon, zoonoses.

Introduction

Zoonoses are defined as “diseases or infections naturally transmissible from vertebrate animals to humans and vice versa” [1]. The emergence and re-emergence of zoonotic infections, and their potentially disastrous impact on human health, are causing growing concern worldwide [2], and this should favor a close collaboration between animal health and public health authorities to address the issue [3]. Brucellosis, rabies, trypanosomiasis, bovine tuberculosis, cysticercosis, echinococcosis, and anthrax are listed as seven endemic zoonoses of global concern [4]. Third world countries are more affected by infectious and communicable diseases, most of which are zoonotic and have destructive social and economic effects [5].

In Cameroon, cattle farming is an intense activity. The cattle herd is estimated at about 5 million heads, and the most practiced farming system is extensive farming [6], which promotes close and prolonged contact between humans and their cattle. These contacts increase the risk of exposure to zoonoses [6]. Cameroon’s West region, despite its relatively low population compared to the rest of the country, constitutes an interesting study area. In recent years, the livestock sector has grown significantly in Cameroon’s West region [6]. A number of recent studies conducted in Cameroon; on avian influenza by Feussom[7] in the West Region, on rabies by Centre Pasteur[8] in the Central Region, on tuberculosis in abattoirs located in western areas,
by Awah [9], on brucellosis by Bayang [10] in the Northwest Region, and on anthrax by UN-OCHA [11] in the Northwest Region show that the occurrence of zoonoses should be a national concern. Nevertheless, there is very limited information on the knowledge, attitudes, and practices (KAP) of shepherds, who are mostly exposed to zoonoses transmitted by cattle in Cameroon’s West region. Yet, their involvement is essential to successfully control and manage the spread of these diseases. This study was undertaken to assess the shepherds’ knowledge of zoonoses transmitted by cattle and to identify their attitudes and practices in regard to the adoption of measures to prevent and combat them.

Materials and Methods

Ethical approval and informed consent

Ethical approval was obtained from the ethical review committee of Université des Montagnes, Bangangté (2017/195/UDM/PR/CIÉ). The consent was obtained from all respondents before the commencement of data collection.

Study period and location

The study was conducted from August to October 2017 in the west region of Cameroon; at the cattle markets in Bamboutos, Menoua, Ndé, and Noun. They are open for business for 1 or 2 days a week. The west region of Cameroon is experiencing strong livestock growth made up of species such as zebu (peuhl, white fulani, red fulani, goudali, and others).

Study design and participants

A descriptive cross-sectional survey was employed in this study. A preliminary questionnaire was tested on ten participants. The study participants were shepherds from Cameroon’s West region. All consenting participants were included in the study, and individuals who were not from this region were excluded from the study.

Sample size determination

The minimum size was calculated using the Charan and Biswas formula for descriptive studies [12]: n = \( \frac{t^2 \times p(1-p)}{m^2} \)

Where n is the minimum sample size needed,

- m is the level of error that can be tolerated (0.05 chance of error)
- p is the proportion we assumed would answer yes to the question concerning the knowledge on zoonoses. It was set arbitrarily at 50%.
- t is the standard normal deviation corresponding to a 95% confidence level.

At 95% level confidence level, t = 1.96

n = \( \frac{1.96^2 \times 0.5 \times (1-0.5)}{0.05^2} \)

n = 384.16

The minimum sample size was rounded up to 384.

Data collection

Convenience sampling was conducted using a semi-structured interviewer-administered questionnaire. The interview was mainly conducted in “Foulbé” (local language), with the help of an interpreter, followed by French and “Pidgin English” (a mixture of English and other languages, which allows communication among people who do not share a common language). The interviewees were questioned on their KAP toward zoonoses. A total of 218 shepherds were interviewed (instead of 384, as previously planned), due to time constraints imposed by cattle market operations. The questionnaire is available on request to the corresponding author.

Statistical analysis

The data collected were entered in Sphinx, plus2 software version 5.1.0 (Sphinx, France), exported to Microsoft Excel (Microsoft Corporation, USA), and analyzed in R, version 2.13.0. (R Foundation, Vienna, Austria). The proportions of each response modality were obtained by taking as denominator the number of respondents for each question. This number varied because some questions were not answered by all interviewees. The descriptive results were summarized using frequency tables and charts. The association between socio-demographic characteristics and knowledge was assessed using the Chi-square test at a 5% significance level [13].

Results

Respondents were mainly male, with a low level of education. Specifically, 94% of the interviewed shepherds had no education. Overall, the following numbers of interviewees did not answer questions related to: mode of transmission, 142; treatment, 151; blood consumption, 2; and hand sanitation, 1.

Shepherds’ knowledge of zoonoses transmitted by cattle

Before specifically asking questions about zoonoses, a general question was posed about which diseases the shepherds normally encountered. The diseases cited were parasitic infections due to ticks (24.3% of respondents), followed by foot-and-mouth disease (21.9%) which is more encountered in the Ndé Division and contagious bovine peripneumonia (19.2%), more reported in the Ndé Division. The vast majority of shepherds (89.5%) did not know the definition of zoonosis (Table 1). It is noteworthy that 94% of shepherds did not have any education. A significant difference was observed between the interviewees’ educational level and knowledge of the definition of zoonosis (p = 0.03). Majority of shepherds (74.6%) mentioned tuberculosis (identified by the caseous nodules found in lymphatic nodes); 26.8% mentioned fascioliasis, described by the presence of a common liver fluke found in the liver after the animals have been slaughtered; 2.8% mentioned brucellosis when speaking of abortion cases with swollen knees; and 1.4% of shepherds cited anthrax without describing any symptom. The best known modes of transmission of zoonoses were: Consumption of contaminated meat.
(30.3%), followed by ingestion of contaminated milk (28.4%); contact with excretions and secretions of sick animals (11.5%); and direct contact with sick animals (10.1%). Almost 60% of the shepherds reported abortions during the third trimester of gestation associated with hygromas, called “Bakhalé” meaning brucellosis in local language, which would indicate the presence of brucellosis.

**Attitudes and practices of shepherds in terms of zoonosis prevention and treatment**

From this study, it emerged that the vast majority of shepherds (93.6%) treat sick animals using veterinary drugs bought at the livestock market without a prescription, 75.7% sell them before treatment, 19.7% slaughter them, and 4.1% quarantine the animals. Most shepherds (95.9%) leave dead animals in the wild; 37.1% bury them, while 10.6% consume their meat. Milk is consumed either raw or cooked. A greater proportion of shepherds (55.3%) prefer to drink raw milk, while the rest (44.7%) pasteurize it before drinking. Meat is also consumed either cooked or raw. Specifically, 77.0% and 23.0% of shepherds reported consuming cooked (38.4% boiled; 37.5% roasted; and 1.10% dried) and raw meat, respectively. Almost all shepherds (98.1%) indicated that the consumption of blood is prohibited. To the question: “Do you wash your hands after being in contact with animals?” 83.5% of the respondents confirmed that they always wash their hands, 7.8% said that they often wash them but not always, and 8.7% stated that they do not wash their hands at all. Only 7.8% of shepherds had some knowledge of zoonoses, mainly on tuberculosis. The majority (88.3%) showed an interest in receiving information on zoonoses.

**Discussion**

**Shepherds’ knowledge of zoonoses transmitted by cattle**

From the KAP survey on zoonoses conducted among shepherds in Cameroon’s Western Region, it emerges that most shepherds do not know what zoonosis is. On the other hand, in Senegal, a little more than a quarter (30.1%) of the participants in the same survey knew, or had heard of, the term zoonosis [14]. The lack of knowledge regarding zoonotic diseases may be explained by the low level of education reported among shepherds. This is in contrast with research results reported in the Punjab region, India, where 77.6% of breeders possessed a primary, secondary or higher level of education [15]. As shepherds are known to be frequently in contact with livestock, it is necessary to raise their awareness, and to provide them with educational opportunities regarding zoonotic diseases and their control. The importance of education is emphasized by the fact that a significant correlation was recorded between the level of education and the likelihood that shepherds knew the definition of zoonosis. However, despite the fact that shepherds are generally not educated, some have empirical knowledge of zoonoses, mainly of tuberculosis and, to a lesser extent, of fascioliasis, brucellosis, and anthrax. These are the most widespread diseases in the region; tuberculosis and fascioliasis, in particular, are frequently detected in slaughterhouses. The ingestion of contaminated milk, as well as the consumption of contaminated meat, are known as risky practices, as they are modes of transmission of zoonoses. In India, 55.6% and 67.2% of shepherds mentioned the consumption of contaminated milk and meat, respectively [15]. These percentages are considerably higher than those recorded in the present study, highlighting again the need for proper education and training to raise awareness about zoonoses. Farmers possess a significant body of knowledge, in their own local language, about the clinical signs associated with these pathogens. As part of a surveillance program, the comprehensive understanding of local expressions could play an important role in the detection of suspected diseases. A study in India revealed that 47.2% of the surveyed farmers were aware of the fact that animals can abort during the third trimester of gestation because of brucellosis [15]. It was observed that the percentage of shepherds with similar knowledge was higher in surveyed areas in Senegal. The fact that shepherds have such knowledge concerning brucellosis, and can describe its clinical signs, will facilitate the control and management of this disease.

**Attitudes and practices of shepherds in terms of zoonosis prevention and treatment**

Sick animals are generally treated without the advice of a veterinarian, and shepherds mostly buy drugs from the cattle markets without any prescription. This situation points to the urgency of controlling the use of veterinary drugs, raising farmers’ awareness of the disadvantages of treating animals without veterinary prescription and about the development of antimicrobial resistance, as well as to the need of involving
veterinarians in the assistance of pastoral activities. In
the event of death, 95.9% of shepherds leave the ca-
casses in the wild. This practice could be explained by
the fact that in the “Mbororo” culture, it is forbidden to
touch the carcass of a dead animal, as it is considered
a potential source of germs that could then be spread
[16]. In contrast, in Turkey, for example, 22.5% of
shepherds dispose of the carcasses of animals that died
from disease by burying them deep into the ground
[17]. Both the practices of burying the carcasses and
leaving them out in the wild are risky due to the pos-
sible persistence of pathogens in the environment and
contamination of groundwater. Consumption of (raw)
milk is a common practice in Senegal [14], where it
was reported that 95% of the farmers drank fresh milk
without prior heat treatment. The consumption of fresh
milk is preferred because heating alters its taste. This
indicates that globally, in Africa, the consumption of
raw or fresh milk is a risky practice, and farmers are
aware of it. In terms of meat consumption, most shep-
herds were reported to eat cooked meat. However,
even if only a minority of them eats very limited
amounts of uncooked meat, this is still a risk that must
be addressed by public health officials. Consumption
of blood is prohibited by cultural law, says 98.1% of
herdsmen. Although in Tanzania [18], it was reported
that 43% of producers consume raw blood. Such prac-
tice is considered risky because of possible disease
transmission. For example, consumption of raw pig
products, including blood, is associated with trichinel-
llosis and Streptococcus suis meningitis infections in
humans [19]. In relation to hand washing after contact
with animals, 83.5% of farmers reported always wash-
ing their hands, against the 7.8% who washed them
occasionally during milking. In Turkey, [17] it was
reported that 91.4% of shepherds wash their hands
after being in contact with animals. Although the per-
centage of respondents who confirmed washing their
hands is high, it is important to consider that in studies
on the prevalence of handwashing conducted in public
settings, over-reporting of compliance to this hygiene
practice is often observed [20]. Following our results
in Cameroon on awareness of zoonosis, <10% of the
shepherds said that they had already been made aware
at least once about such disease by a local veterinarian,
or by the competent authorities during vaccination
campaigns, or at slaughterhouses. On the other hand,
more than half of the shepherds were simply not aware
of zoonoses. Although a majority (88.3%) of the sur-
veyed shepherds declared their interest in learning
more about zoonoses, a minority remained reluctant
because, according to them, the results of surveys in
which they had participated before have never been
forwarded to them.

Limitation of the study

It should be noted that the present study has some
limitations. Our sampling focused only on four divi-
sions (Noun, Ndé, Bamboutos, and Menoua) instead
of all the eight that constitute Cameroon’s West region
because in these four, more cattle are present and live-
stock markets are functional. Although it was not pos-
sible to interview as many shepherds as desired, we
believe that the scale of the survey still provides an
overview of the target population. There was likely
almost no selection bias because, as farming areas are
difficult to access, all cattle farmers move around in
search of greener pastures and then travel to the cattle
markets. Furthermore, all shepherds contacted during
our investigation agreed to participate.

Conclusion

To raise shepherds’ awareness on bovine zoono-
ses is important in preventing and combating disease
transmission because shepherds are in contact with
animals and other people, they may contribute to envi-
ronmental contamination. A One Health Community
approach is required to control zoonosis transmission.
Campaigns for the education and training of shepherds
should be organized frequently to increase the know-
edge and modify the perception of these stakeholders
regarding zoonoses. This achievement is essential to
promote and establish better hygienic practices in the
field.

Authors’ Contributions

JV, ARB, NNA, and KKAP: Conceptualized and
designed the study. KKAP: Data collection. KKAP and
NCR: Data analysis. KKAP, OWD, and JV: Review of
data for critical intellectual content. All authors read
and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing
interests.

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