

Knowledge, attitudes and practices associated with giardiasis among cattle handlers in Jere, Borno State, Northeastern Nigeria

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Keywords

Cattle, Giardia, knowledge, attitudes, disease control, Nigeria

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Summary

This study was designed to assess the level of knowledge, attitudes and practices (KAP) of cattle handlers (cattle owners, cattle attendants and veterinarians) concerning giardiasis in Jere Local Government Area (LGA) of Borno State, Northeastern Nigeria. Using a pre-validated questionnaire, 278 cattle handlers from six wards of Jere were interviewed, with a 84% (n = 252) response rate. The majority of the respondents were aged 27–38 years (62.3%), male (93.7%) and Muslim (96%). Regarding the control and prevention of giardiasis, 31.3%, 44.8% and 31.3% of the cattle handlers had good knowledge, attitudes and practices, respectively. The overall mean scores of 59.5%, 64.8% and 64.1% for knowledge, attitudes and practices were significantly ($p < 0.05$) lower than the $\geq 75\%$ cut-off mark set for a good KAP score on giardiasis. Furthermore, there was a moderate, positive and significant ($p < 0.05$) correlation between the knowledge score and the attitudes and practices scores. The handlers' knowledge and attitudes had significant associations ($p < 0.05$) with their levels of education and years of experience, signifying that high levels of education and years of experience were associated with improved awareness of giardiasis among cattle handlers. The study concluded that there is a potential risk of cattle handlers being infected with *Giardia lamblia* based on their overall suboptimal levels of knowledge, attitudes and practices toward giardiasis observed in the study area. Raising awareness among cattle handlers about the public health implications of giardiasis in the study area was recommended.

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■ INTRODUCTION

Cattle play a critical role in the family economy as a source of livelihoods, especially in rural areas (Kaur et al., 2017; Kubkomawa, 2017; Baltenweck et al., 2020). They are raised for their meat, milk, hides and draft power (Kubkomawa, 2017). Furthermore, cattle dung is used as manure (fertilizer), fuel for cooking, and material for building (Shaibur et al., 2021). In Nigeria, rural livestock farmers predominantly practice traditional livestock farming (backyard system) devoid of modern technology, and seldom have access to good veterinary services (Hajdu et al., 2020). This type of livestock farming is vulnerable to infection due to limited access to clean water, product safety issues, environmental contamination, poverty and ignorance (Thompson and Kutz, 2019; Hajdu et al., 2020). This in turn increases the likelihood of

the spread of zoonotic diseases among people living with or in proximity to livestock and cattle handlers (Rahman et al., 2020).

Giardiasis is a common gastrointestinal disease caused by a protozoan parasite, *Giardia lamblia* (Ryan and Zahedi, 2019; Belkessa et al., 2021). It is endemic in areas where there is poor hygiene (Roshidi et al., 2021). Outbreaks of zoonotic giardiasis are usually associated with direct contact with infected animals, exposure to contaminated environments, contaminated water sources, poor personal hygiene, ignorance, and poverty (Roshidi et al., 2021; Hajar et al., 2022). The symptoms of giardiasis appear one to two weeks following exposure, and can range from none (asymptomatic) to severe diarrhea and malabsorption, causing over 3 million deaths annually in children (Biu and Adam, 2004).

Conditions such as the displacement and forceful resettlement of large numbers of people—internally displaced persons—and the proximity of livestock to handlers' households have been shown to increase the incidence of zoonotic giardiasis (Chen et al., 2021). In Northeastern Nigeria, Borno State (the epicenter of the Boko Haram insurgency) has been bedeviled by armed conflict for over a decade, resulting in the forcible displacement of more than 3 million rural households (Lenshie

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and Henry, 2016). Many of these rural households have relocated to Maiduguri metropolis and are concentrated in internally displaced persons camps. This scenario, coupled with poor hygiene, poverty and limited access to quality health care (Adenowo et al., 2015; Omole et al., 2015), is increasing the likelihood of the dissemination and spread of giardiasis in Borno State. Jere Local Government Area (LGA), one of the LGAs that constitute Maiduguri metropolis, has a high population density, partly due to the migration of cattle herders and rural households from insurgency-ravaged areas of the state. Coupled with the high contagiousness of giardiasis facilitated by an increased frequency of interactions between households and cattle herders, there is an increased likelihood of the occurrence of zoonotic giardiasis. Previous studies have documented the endemicity of giardiasis in Borno State. Biu and Harry (2001) and Biu et al. (2009) reported a prevalence of 5.5% in school children in Maiduguri, and 33.2% among outpatients of the University of Maiduguri Teaching Hospital.

To control the spread of giardiasis, information is needed to assess the levels of knowledge and perceptions of safe cattle handling practices among cattle handlers. This study therefore aimed to determine the levels of knowledge, attitudes and practices (KAP) of cattle handlers (cattle owners, cattle attendants and veterinarians) regarding giardiasis in Jere LGA of Borno State, Northeastern Nigeria.

■ MATERIALS AND METHODS

Study area

The study was conducted in Jere LGA of Borno State, Northeastern Nigeria. It lies within latitudes 11°40' and 12°05'N and longitudes 12°20' and 13°50'E. The LGA has 12 wards, which include Alau, Bale Galtimari, Dala Lawanti, Dusuman, Gomari, Gongulong, Maimusari, Mairi, Mashamari, Khaddamari, Old Maiduguri and Tuba. The population of the LGA was estimated to be 306,400 in 2022, with a population density of 386.2 inhabitants per km².

Study design

An analytical cross-sectional study was conducted among cattle handlers (cattle owners, cattle attendants and veterinarians). Based on the availability of security, six wards in Jere LGA (Khaddamari, Old Maiduguri, Maimusari, Mashamari, Dusuman and Bale Galtimari) were selected for the survey. The required number of samples ($n = 278$) was determined using the Krejcie and Morgan (1970) table. However, to increase the chances of response, 300 questionnaires were distributed. Participants were recruited by convenience sampling.

Administration of questionnaire

A closed-ended questionnaire was developed to measure the level of knowledge, attitudes and practices of consenting cattle handlers regarding giardiasis. Trained research assistants administered the questionnaire. To ensure its validity and practicability, the questionnaire was tested on 20 randomly selected cattle handlers in the study area. Questions were subsequently modified where required. The reliability analysis yielded a Cronbach's Alpha value of 0.832.

The questionnaire was divided into four sections covering the cattle handlers' demographic characteristics, knowledge about giardiasis (i.e., risk factors, clinical presentation, transmission and prevention), attitudes about giardiasis in relation to personal beliefs and experience, and daily behavioral practices related to giardiasis, covering hygiene practices and disease reporting. The scoring method was adopted from Sutanto (2013) and modified to better suit the target objectives of this research. Briefly, the cattle handlers' maximum KAP score was 100 and the minimum was 0. Therefore, based on quartiles/percentiles (Q1 or 25%, Q2 or 50% and Q3 or 75%), any score < 50% was

categorized as low knowledge, negative attitudes and inappropriate practices. Scores $\geq 50\% < 75\%$ were termed as moderate knowledge, neutral attitudes and moderate practices, while scores $\geq 75\%$ were defined as good knowledge, good attitudes and good practices.

Data analysis

Data generated from this study were analyzed using the IBM® SPSS Statistics version 20 (IBM, Armonk, NY: IBM Corp.). Results were presented using tables and percentages. Where appropriate, the chi-square test or Fisher's exact test were used for reporting odds ratios (OR) and their respective 95% confidence intervals. A one-sample t-test was used to determine associations between respondents' KAP scores and outcomes. A score cut-off of $\geq 75\%$ was set to define good knowledge, good attitudes and good practices. Pearson's correlation was used to assess the association between giardiasis knowledge and the attitudes and practices scores of the respondents. Values of $p \leq 0.05$ were regarded as statistically significant.

■ RESULTS

Demographic characteristics of respondents

A total of 300 pre-tested questionnaires were administered from 20 September to 15 November 2021. Due to non-response, 27 questionnaires were dropped, bringing the number of those completed and returned to 273. Of these, 21 questionnaires were excluded due to substantial missing data. The total number of questionnaires with analyzable data was 252, representing a response rate of 84%. The mean age of the respondents was 34.5 ± 8.29 years (IQR: 9.6); 236 (93.7%) were male and 16 (6.3%) were female. Of the 252 respondents, 242 (96.0%) were Muslim, the remainder were Christians. In terms of education levels, 19 respondents (7.5%) had been schooled informally, 35 (13.9%) had attended primary school, 104 (41.3%) secondary school, and 94 (37.3%) had reached a tertiary level. Regarding occupations, 130 (51.6%) were cattle owners, 115 (45.6%) cattle attendants, and 7 (2.8%) were veterinarians (Table I).

Respondents' responses to knowledge, attitude and practice questions regarding giardiasis

The results regarding knowledge of giardiasis revealed that 155 (61.5%) of the respondents identified giardiasis as an intestinal infection and more than half ($n = 165$, 65.5%) believed that it is contagious, while only 133 (44.8%) mentioned contact or contaminated food and water as a mode of transmission. Of the 252 respondents, 199 (79.0%) identified farmers/herders as risk groups, 159 (63.1%) believed poor hygiene is a predisposing factor for the infection, while 150 (59.5%) said that giardiasis spread among people through close contact with infected people. Over two-thirds ($n = 177$, 70.2%) of the respondents agreed that giardiasis is preventable, and 145 (57.5%) identified personal hygiene practice as a preventive measure.

The results regarding attitudes toward giardiasis revealed that 155 (61.5%) of the respondents agreed that giardiasis could be transmitted from animals to humans, while only 97 (38.5%) believed that giardiasis issues are important for their health. Moreover, 172 (68.3%) agreed that building public toilets and good sanitation practices are beneficial in controlling giardiasis, while 137 (54.4%) were satisfied with government efforts to control open defecation.

The responses regarding practices behavior revealed that 88 (34.9%) of the respondents used proper personal protective equipment when handling animals and their products, and 100 (39.7%) only used this equipment before contact with animals that were sick or had diarrhea. In terms of hygiene, 133 (52.8%) often washed their hands after handling animals and their products, 128 (50.8%) used detergent or

Table I: Demographic characteristics of the cattle handlers in Jere, Borno State, Northeastern Nigeria (n=252) // Paramètres démographiques des acteurs de l'élevage de Jere, Etat de Borno, nord-est du Nigéria

Characteristic	Categories	No. (%)
Age	15 – 26	32 (12.7)
	27 – 38	157 (62.3)
	39 – 50	53 (21.0)
	51 – 63	10 (4.0)
Gender	Male	236 (93.7)
	Female	16 (6.3)
Religion	Islam	242 (96.0)
	Christian	10 (4.0)
Occupation	Cattle owner	130 (51.6)
	Cattle attendant	115 (45.6)
	Veterinarian	7 (2.8)
Level of education	Informal	19 (7.5)
	Primary	35 (13.9)
	Secondary	104 (41.3)
	Tertiary	94 (37.3)
Year of experience	<1 year	48 (19.0)
	1 – 4 years	104 (41.3)
	5 – 10 years	69 (27.4)
	> 10 years	31 (12.3)

No.: Number; %: Percent

disinfectant to clean their hands, 60 (23.8%) consumed raw (unprocessed) vegetables, and only 148 (58.7%) regularly wash their vegetables before consumption. Regarding open defecation, 42 (16.7%), 102 (40.5%) and 108 (42.9%) did so all the time, sometimes and never, respectively.

In terms of overall KAP scores, Table II shows that out of the 252 respondents, 78 (31.0%), 95 (37.7%) and 79 (31.3%) had low, moderate and good knowledge of giardiasis, respectively. In addition, 56 (22.2%), 83 (32.9%) and 113 (44.8%) had a negative, neutral and good attitude toward the disease, respectively. The result also demonstrated that 26 (10.3%), 147 (58.3%) and 79 (31.3%) of the cattle handlers in the study area had an inappropriate, moderate and good level of practice toward giardiasis, respectively.

Respondents' KAP scores with good cut-off marks (≥ 75)

Table III shows that the mean for knowledge scores obtained (59.5 ± 24.6) was significantly ($t_{(251)} = -9.985, p < 0.0001$) lower than the cut-off mark for a good knowledge score of ≥ 75 . Similarly, the mean for attitudes scores obtained (64.8 ± 25.0) was significantly ($t_{(251)} = -6.475, p < 0.0001$) lower than the cut-off mark for a good attitudes score of ≥ 75 . Furthermore, the mean for practices scores obtained (64.1 ± 16.3) was significantly ($t_{(251)} = -10.610, p < 0.0001$) lower than the cut-off mark for a good practice score of ≥ 75 .

Association between cattle handler's knowledge, attitudes and practices scores

Table IV shows that there was a positive and significant correlation between the level of knowledge with the attitudes ($r = 0.631; p < 0.0001$) and practices scores ($r = 0.529; p < 0.0001$). Similarly, there was also a positive and significant correlation between attitudes and practices scores ($r = 0.426; p < 0.0001$).

Association of respondents' knowledge with their demographic characteristics

Table V shows that cattle handlers ≤ 38 years of age had a higher likelihood of having low knowledge compared to those > 38 years of age (OR = 1.4; 95% CI = [0.75, 2.73]). However, this was not statistically significant. Male cattle handlers had a higher likelihood of having low knowledge of giardiasis compared to female handlers (OR = 1.4; 95% CI = [0.43, 4.39]). However, this also was not statistically significant. Cattle handlers with low levels of education were significantly found to be 3.5 times more likely to have low knowledge compared to

Table II: Knowledge, attitudes and practices (KAP) toward giardiasis among cattle handlers (n=252) in Jere, Borno State, Northeastern Nigeria // Connaissances, attitudes et pratiques (KAP) des acteurs de l'élevage (n=252) vis-à-vis de la giardiose, à Jere, Etat de Borno, nord-est du Nigéria

Parameter	Category	No. (%)
Knowledge score	Low score (0–49)	78 (31.0)
	Moderate score (50–74)	95 (37.7)
	Good score (75–100)	79 (31.3)
Attitude score	Negative score (0–49)	56 (22.2)
	Neutral score (50 – 74)	83 (32.9)
	Good score (75–100)	113 (44.8)
Practice score	Inappropriate score (0–49)	26 (10.3)
	Moderate score (50–74)	147 (58.3)
	Good score (75–100)	79 (31.3)

No.: Number; %: Percent

Table III: Respondents' KAP scores with good cut-off marks (≥ 75) // Scores KAP obtenus par les personnes enquêtées supérieurs à la valeur seuil (≥ 75)

Parameter	t	DF	p-value	Mean	SD	SE
Knowledge score	-9.985	251	<0.0001	59.5	24.6	1.550
Attitudes score	-6.475	251	<0.0001	64.8	25.0	1.575
Practices score	-10.610	251	<0.0001	64.1	16.3	1.024

t: one-sample t-test; DF: degree of freedom; SD: standard deviation; SE: standard error

Table IV: Correlation between cattle handler's knowledge, attitudes and practices scores // Corrélation entre les scores de connaissances, attitudes et pratiques des acteurs de l'élevage

Scores		Knowledge	Attitudes	Practices
Knowledge	Pearson Correlation	1	0.631**	0.529**
	Sig. (2-tailed)		<0.0001	<0.0001
	N	252	252	252
Attitudes	Pearson Correlation	0.631**	1	0.426**
	Sig. (2-tailed)	<0.0001		<0.0001
	N	252	252	252
Practices	Pearson Correlation	0.529**	0.426**	1
	Sig. (2-tailed)	<0.0001	<0.0001	
	N	252	252	252

** Correlation is significant at the 0.01 level (2-tailed).

those with high levels of education (OR = 3.5; 95% CI = [1.85, 6.61]; $p < 0.0001$). Cattle handlers with ≤ 10 years of experience were significantly found to be 7.6 times more likely to have low knowledge compared to those with > 10 years of experience (OR = 7.6; 95% CI = [1.77, 32.71]; $p = 0.002$). There was no significant association between respondents' knowledge scores and their occupation ($p > 0.05$).

Association of respondents' attitudes with their demographic characteristics

Table VI shows that cattle handlers ≤ 38 years of age were found to be 2.0 times more likely to have a negative attitude compared to those

> 38 years of age (OR = 2.0; 95% CI = [0.91, 4.33]). However, this was not statistically significant. Male cattle handlers were less likely to have a negative attitude compared to female handlers (OR = 0.6; 95% CI = [0.20, 1.83]). However, this was not statistically significant. Cattle handlers with low levels of education were significantly found to be 4.7 times more likely to have a negative attitude compared to those with high levels of education (OR = 4.7; 95% CI = [2.11, 10.44]; $p < 0.0001$). Cattle handlers with ≤ 10 years of experience were significantly found to be 9.9 times more likely to have a negative attitude compared to those with > 10 years of experience (OR = 9.94; 95% CI = [1.32, 74.60]; $p = 0.007$). There was no significant association between respondents' attitudes scores and their occupation ($p > 0.05$).

Table V: Association of respondents' level of knowledge with their demographic characteristics /// *Association entre les niveaux de connaissance des personnes interrogées et leurs caractéristiques démographiques*

Demographic characteristic	Knowledge		OR (95% CI)	χ^2	p - value
	Low	Moderate + Good			
Age					
≤ 38 years	62	127	1.4 (0.75, 2.73)	1.213	0.271
> 38 years	16	47	Ref.		
Gender					
Male	74	162	1.4 (0.43, 4.39)	NA	0.782*
Female	4	12	Ref.		
Level of education					
Low	63	95	3.5 (1.85, 6.61)	15.773	<0.0001
High	15	79	Ref.		
Years of experience					
≤ 10 years	76	145	7.6 (1.77, 32.71)	9.929	0.002
> 10 years	2	29	Ref.		
Occupation					
Cattle owner + Cattle attendants	78	167	-	NA	0.103*
Veterinarian	0	7	-		

+: Combined; OR: odds ratio; CI: confidence interval; * Fisher's exact test statistic; NA: Not applicable

Table VI: Association of respondents' attitudes with their demographic characteristics /// *Association des types d'attitude des personnes interrogées avec leurs caractéristiques démographiques*

Demographic characteristic	Attitudes		OR (95% CI)	χ^2	p - value
	Negative	Neutral + Good			
Age					
≤ 38 years	47	142	2.0 (0.91, 4.33)	3.061	0.080
> 38 years	9	54	Ref.		
Gender					
Male	51	185	0.6 (0.20, 1.83)	NA	0.360*
Female	5	11	Ref.		
Level of education					
Low	48	110	4.7 (2.11, 10.44)	16.308	<0.0001
High	8	86	Ref.		
Years of experience					
≤ 10 years	55	166	9.9 (1.32, 74.60)	7.380	0.007
> 10 years	1	30	Ref.		
Occupation					
Cattle owner + Cattle attendants	56	189	-	NA	0.354*
Veterinarian	0	7	-		

+: Combined; OR: odds ratio; CI: confidence interval; * Fisher's exact test statistics; NA: Not applicable

Association of the respondents' knowledge and attitudes with their practices

Table VII shows that cattle handlers with low knowledge were about 2.1 times more likely to have inappropriate practices compared to those with moderate and good knowledge combined (OR = 2.1; 95% CI = [0.91, 4.33]). However, this was not statistically significant. Cattle handlers with a negative attitude had a lower likelihood of having an inappropriate practice compared to those with a neutral and good attitude combined (OR = 0.6; 95% CI = [0.20, 1.83]). However, this was not statistically significant.

DISCUSSION

Giardiasis represents an important zoonosis with cross-infectivity between animals and humans. Several studies, especially ones from developing countries such as Ethiopia, have documented the prevalence of *G. lamblia* and *G. duodenalis* infection among school children (Hajare et al., 2022; Haftu et al., 2014; Hailegebriel 2017; Tijani et al., 2023). *G. lamblia* parasite infection thus represents a leading cause of deaths among children from developing countries. Parasitic infection caused by *G. lamblia* is associated with poor personal hygiene, poverty, poor sanitation practices, and a lack of clean and safe drinking water supplies (Hajare et al., 2022). The current study assesses the knowledge, attitudes and practices associated with giardiasis among cattle handlers from Jere LGA of Borno State, Northeastern Nigeria. More than two-thirds of the respondents had a score that was average (50%) or above for knowledge, attitudes and practices regarding giardiasis preventive measures and control strategies. This score is much higher than that described in a similar study conducted in Turkey, which reported a mean score of 7.9% (Özlü et al., 2020). The discrepancy could be attributed to the fact that giardiasis is more common in regions with poor sanitation such as Jere, where it poses a greater public health burden to local communities. In addition, the majority of the respondents (cattle handlers) got their information from an ongoing mass campaign concerning fecal-related diseases conducted by relevant public health authorities in collaboration with non-governmental organizations, while the rest obtained their information from personal experiences, which could be a reflection of their educational background. In our opinion, both sources of information may have contributed to reducing the number of giardiasis outbreaks among Jere residents despite the prevalence of the disease among cattle reported previously (Jidda et al., 2023).

About half of the respondents do not regard giardiasis as an issue relevant to their health, which is a reflection of the suboptimal KAP mean scores observed of 59.5%, 64.8% and 64.1% for knowledge, attitudes and practices, respectively. This could be attributed to

the asymptomatic nature of the disease in most individuals as was observed by Fletcher et al. (2012). The majority of the respondents knew that the disease affects the intestines, and identified contact with contaminated food and water as a means of transmission, as was previously reported (Carmena et al., 2012; Public Health Ontario, 2017; Kudah et al., 2018). However, only about 50% of the respondents had good knowledge of personal hygiene preventive measures such as hand washing with soap and water and washing raw vegetables and fruit before consumption (Freeman et al., 2014; WHO, 2014). Inadequate personal hygiene during and after close contact with infected cattle and their dung can cause zoonotic giardiasis. People such as cattle herders, who are in continuous contact with cattle, therefore run a high risk of becoming infected.

In our study, 61.5% of the respondents were aware of the zoonotic nature of the disease, as was corroborated by Zajackowski et al. (2021) and Wu et al. (2022). However, fewer of them recognized contact with cattle and cattle dung as a likely means of transmission. Furthermore, our findings indicated that about one third of the respondents allowed their children to come in contact with cattle or roam around within the herd in the study area, despite the high risk and severe diarrhea associated with *Giardia* in young children (Wu et al., 2022). In addition, *Giardia* can result in post-infection and extra-intestinal complications in young children, as was reported by Allain and Buret (2020). These abnormalities include maldigestion, malabsorption, increased transit, mucus depletion, growth stunting, disruptions of microflora, increased epithelial permeability, loss of intestinal barrier function and invasion of gut bacteria.

We also found that more than two-thirds of the respondents acknowledged the benefits of government programs, like the building of public toilets in rural settings and sanitation exercises on controlling fecal-related diseases, as Mbuya and Humphrey (2016) also suggested. However, about half of the respondents reported defecating in the open air. The persistence of their attitudes and practices regarding open defecation could be that public toilets had not yet been installed in their communities, or simply be due to misconceptions. Therefore, more remains to be done in terms of awareness-raising programs – with correct health information as part of risk communication – to address the common practice of open defecation in the study area.

While age and gender did not have a significant effect on the respondents' degree of knowledge and attitudes, high levels of education and years of experience did. However, as expected, people with high levels of education were very inquisitive and might have come across articles, workshops and courses that had enhanced their knowledge and attitudes toward giardiasis. Furthermore, over time cattle handlers become more aware about issues related to giardiasis due to personal experience and direct observation; this could help modify their attitudes. The higher knowledge and attitudes scores of veterinarians

Table VII: Association of respondents' knowledge and attitudes with their practices /// Association entre les niveaux de connaissance et les types d'attitudes des personnes interrogées avec leurs pratiques

Variable	Practices		OR (95% CI)	χ^2	p – value
	Inappropriate	Moderate + Good			
Knowledge					
Low	12	66	2.1 (0.91, 4.73)	3.135	0.077
Moderate + Good	14	160	Ref.		
Attitudes					
Negative	4	52	0.6 (0.20, 1.85)	0.784	0.376
Neutral + Good	22	174	Ref.		

+: Combined; OR: odds ratio; CI: confidence interval

compared to cattle owners and cattle attendants could be attributed to the fact that the veterinarians may have attended courses on zoonoses and disease prevention.

There was a moderate, positive and significant correlation between knowledge, attitudes and practices scores. Similarly, there was also a moderate, positive and significant correlation between attitudes and practices scores. These findings are in line with the knowledge-attitude-practice model based on cognitive-affective-behavior theory in the area of social psychology, which suggests that an increase in knowledge affects attitudes, and consequently changes practices. However, the relationship between a cattle handler's knowledge and attitudes with their practices showed that there was no significant association. The practices of handlers with moderate to good knowledge were no different from handlers who had low knowledge. Both groups implemented inappropriate practices with regard to giardiasis and biosecurity measures. Similarly, handlers who had neutral to good attitudes had inappropriate practices related to giardiasis and biosecurity measures to a greater extent than handlers who had a negative attitude. These may be due to perceived social pressure (subjective norm or situational variables) that may have hindered the handlers from performing the correct practices or from abandoning high-risk giardiasis-related practices. These findings were also in line with those of Hockenbury and Hockenbury (2007), who reported that attitudes and actual behavior are not always perfectly aligned.

Despite the essential insights this study was able to provide, it was limited by the insurgency afflicting the region, which rendered it impossible to cover all wards in the study area. However, it is highly likely that the samples studied are representative of Jere LGA.

■ CONCLUSION

It can be concluded that cattle handlers' knowledge, attitudes, and practices regarding giardiasis are suboptimal, indicating a potential risk of infection from cattle. High levels of education and years of experience were found to be associated with improved awareness of the infection among handlers. Sensitization of cattle handlers about the public health implications of *Giardia lamblia* infection in cattle and the potential of cattle to harbor and transmit zoonotic assemblages of *Giardia lamblia* by relevant health authorities is highly recommended.

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Author contributions statement

AOT and MKL Conceptualized and designed the study. DJ drafted the original manuscript. DJ and AYH collected data. DJ, SMJ and ASM performed statistical analyses. All authors read and approved the final manuscript before submission.

Conflicts of interest

The authors declare that there is no conflict of interest.

Ethical Approval

Since this study was an observational study, University of Maiduguri research ethic committee confirmed that no approval was required.

Consent to Participate

Informed verbal consent was obtained from all participants or parents included in the study.

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Résumé

Lawan M.K., Jajere S.M., Muhammad A.S., Hassan A.Y., Tijani A.O. Connaissances, attitudes et pratiques des acteurs de l'élevage vis-à-vis de la giardiose à Jere, Etat de Borno, nord-est du Nigeria

Cette étude a été conçue pour évaluer le niveau de connaissances, les attitudes et les pratiques des acteurs de l'élevage (propriétaires d'animaux du bétail, gardiens de troupeau, vétérinaires) concernant la giardiose dans le gouvernement de Jere dans l'État de Borno, au nord-est du Nigeria. À l'aide d'un questionnaire, 278 acteurs de six quartiers de Jere ont été interrogés, avec un taux de réponse de 84% (n = 252). La majorité des personnes interrogées étaient âgées de 27 à 38 ans (62,3 %), de sexe masculin (93,7 %) et de confession musulmane (96 %). En ce qui concerne le contrôle et la prévention de la giardiose, 31,3 %, 44,8 % et 31,3 % des acteurs interrogés avaient respectivement de bonnes connaissances, attitudes et pratiques. Les scores moyens globaux de 59,5 %, 64,8 % et 64,1 % pour les connaissances, les attitudes et les pratiques étaient significativement (p < 0,05) inférieurs au seuil de ≥ 75 % fixé pour un bon score KAP sur la giardiose. En outre, il y avait une corrélation modérée, positive et significative (p < 0,05) entre le score des connaissances et les scores des attitudes et des pratiques. Les connaissances et les attitudes des manipulateurs étaient significativement liées (p < 0,05) à leur niveau d'éducation et à leurs années d'expérience, ce qui signifie qu'un niveau d'éducation et des années d'expérience élevés étaient associés à une meilleure sensibilisation à la giardiose. L'étude a conclu qu'il existe un risque potentiel d'infection par *Giardia lamblia* pour les personnes en contact avec le bétail en raison de leurs niveaux sous-optimaux de connaissances, d'attitudes et de pratiques à l'égard de la giardiose observés dans la zone d'étude. La sensibilisation de l'ensemble des acteurs de l'élevage sur l'impact en matière de santé publique de la giardiose devrait être encouragée.

Mots-clés : Bovin, Giardia, connaissance, attitude, contrôle des maladies, Nigéria

Resumen

Lawan M.K., Jajere S.M., Muhammad A.S., Hassan A.Y., Tijani A.O. Conocimientos, actitudes y prácticas asociados a la giardiasis entre los actores del sector ganadero en Jere, estado de Borno, noreste de Nigeria

Este estudio fue concebido para evaluar el nivel de conocimientos, las actitudes y las prácticas de los actores del sector ganadero (propietarios de ganado, pastores, veterinarios...) respecto a la giardiasis en la provincia de Jere, en el estado de Borno, al nordeste de Nigeria. Mediante un cuestionario, se interrogó a 278 actores de seis barrios de Jere, con una tasa de respuesta del 84 % (n = 252). La mayoría de las personas interrogadas tenían de 27 a 38 años (62,3 %), eran de sexo masculino (93,7 %) y de confesión musulmana (96 %). En lo que concierne al control y la prevención de la giardiasis, el 31,3 %, 44,8 % y 31,3 % de los encuestados tenían respectivamente buenos conocimientos, actitudes y prácticas. Las puntuaciones medias globales del 59,5 %, 64,8 % y 64,1 % para los conocimientos, las actitudes y las prácticas eran significativamente (p < 0,05) inferiores al umbral de ≥ 75 % fijado para una buena puntuación KAP sobre la giardiasis. Además, había una correlación moderada, positiva y significativa (p < 0,05) entre la puntuación de los conocimientos y las puntuaciones de las actitudes y de las prácticas. Los conocimientos y las actitudes de los manipuladores estaban significativamente relacionados (p < 0,05) con su nivel de educación y sus años de experiencia, lo que significa que un nivel educativo elevado y una larga experiencia estaban asociados con una mejor sensibilización ante la giardiasis. El estudio concluye que existe un riesgo potencial de infección por *Giardia lamblia* para las personas en contacto con el ganado debido a sus niveles subóptimos de conocimientos, de actitudes y de prácticas respecto a la giardiasis observados en la zona de estudio. Debería incentivarse la sensibilización del conjunto de actores del sector ganadero ante el impacto en materia de salud pública de la giardiasis.

Palabras clave: Ganado bovino, Giardia, conocimiento, actitudes, control de enfermedades, Nigeria

