World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

SEROPREVALENCE OF BOVINE FOOT-AND-MOUTH DISEASE IN THE URBAN COMMUNE OF MAMOU, GUINEA-CONAKRY

Abakar Mahamat CHAHAI [1, 2, *], Lanceï KABA [2], NAIBI KEITOYO Amedé [1, *], Yacouba KONATÉ [2] and Kadiatou SOW [3]

[1] Institute for Livestock Research for Development (IRED), PO Box 433, Route de Farcha, N'Djamena, Chad.
[2] Higher Institute of Veterinary Science and Medicine of Dalaba (ISSMV), PO Box 09, Dalaba, Guinea-Conakry.
[3] Central Veterinary Diagnostic Laboratory of Conakry (LCVD); PO Box 576, Almanya, Kaloum commune, Conakry, Guinea.
* Corresponding Author; Email: mahamatchahaia@gmail.com /naibikeitoyoa@gmail.com

ORCID Details
Abakar Mahamat CHAHAI: https://orcid.org/0009-0000-4224-0377
NAIBI KEITOYO Amedé: https://orcid.org/0009-0006-4121-0356

World Journal of Advanced Research and Reviews, 2026, 32(02), 1123–1131

Publication history: Received on 30 September 2026; revised on 12 November 2026; accepted on 14 November 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.32.2.2825

Copyright © 2026 Author(s) retain the copyright of this article. This article is published under the terms of the Creative Commons Attribution License 4.0

ABSTRACT

Foot-and-mouth disease (FMD) is a highly contagious viral infection that affects artiodactyls and causes major economic losses. This was a cross-sectional, descriptive and analytical study conducted from 1st August to 2 September 2025 in the urban commune of Mamou. The objective of this study was to determine the seroprevalence and to identify the associated risk factors. Two districts and ten neighbourhoods were randomly selected for this study. A total of 121 cattle sera were collected and analysed in the laboratory using the NSP ELISA test. Information on the sampled animals (sex, breed, age) was entered into an Excel spreadsheet, converted to CSV and then imported into R for statistical analysis. The statistical results revealed 13 positive samples, i.e. an overall seroprevalence of 10.74% [95% CI: 5.23–16.25%]. The results of the linear regression showed that females are at higher risk of having the disease than males (OR = 9.56, 95% CI 6.90–21.02%; P-value = 0.036). In addition, cattle aged 5 years and older were 5 times more likely to be seropositive than those aged 3 months–4 years (OR = 4.74; P-value = 0.015). These results underline the need to strengthen surveillance and farmer awareness, and to carry out further studies.

Keywords: Seroprevalence, Foot-and-mouth disease, Cattle, Mamou

1 INTRODUCTION

Foot-and-mouth disease is a highly contagious, virulent and epizootic viral disease that mainly affects domestic and wild cloven-hoofed animals. It is caused by a virus belonging to the family *Picornaviridae*, genus *Aphthovirus*. There are seven main serotypes: C, O, A, SAT1, SAT2, SAT3 and Asia1. Serotype O is the most common worldwide [1]. It is characterised by fever accompanied by lesions of the mouth, feet and udder [2]. It poses a major threat to livestock production systems, particularly in low-income (developing) countries. It sometimes causes very substantial economic losses, with

heavy social consequences for farmers, and hampers trade between countries [3]. Although rarely fatal in adult animals, mortality remains high in young animals owing to their greater susceptibility to the disease, related to myocarditis, or to a lack of suckling when the dam is affected [4]. In 2022, a study conducted in Burkina Faso reported 433 animal deaths, i.e. a mortality rate of 63.7%. The financial losses linked to this epizootic were estimated at 99.653.230 FCFA, or 167.460 USD [2].

Globally, it is one of the animal diseases of highest economic priority [5].

Foot-and-mouth disease (FMD) remains endemic in most African countries, despite the many interventions put in place to control it. Earlier studies conducted in Cameroon and Egypt reported overall prevalences of 74.55% [6] and 67.9% [7], respectively.

In the Republic of Guinea, cattle farming is an essential resource for the national economy, but the actual prevalence of foot-and-mouth disease remains poorly known despite the endemic nature of the disease and the country's geographical position. Hence the need for this study, whose general objective is to determine the seroprevalence and the risk factors.

2 MATERIALS AND METHODS

2.1 Description of the study area

Mamou commune is located in Middle Guinea, about 260 kilometres north of the political capital, Conakry. It is bounded to the north by the sub-prefectures of Tolo and Bouliwel; to the south-east by the sub-prefecture of Soyah; to the east by the sub-prefectures of Soya and Dounet; and to the west by the sub-prefecture of Konkouré. With an area of 8.000 km^2, it is subdivided into 23 neighbourhoods and 5 districts.

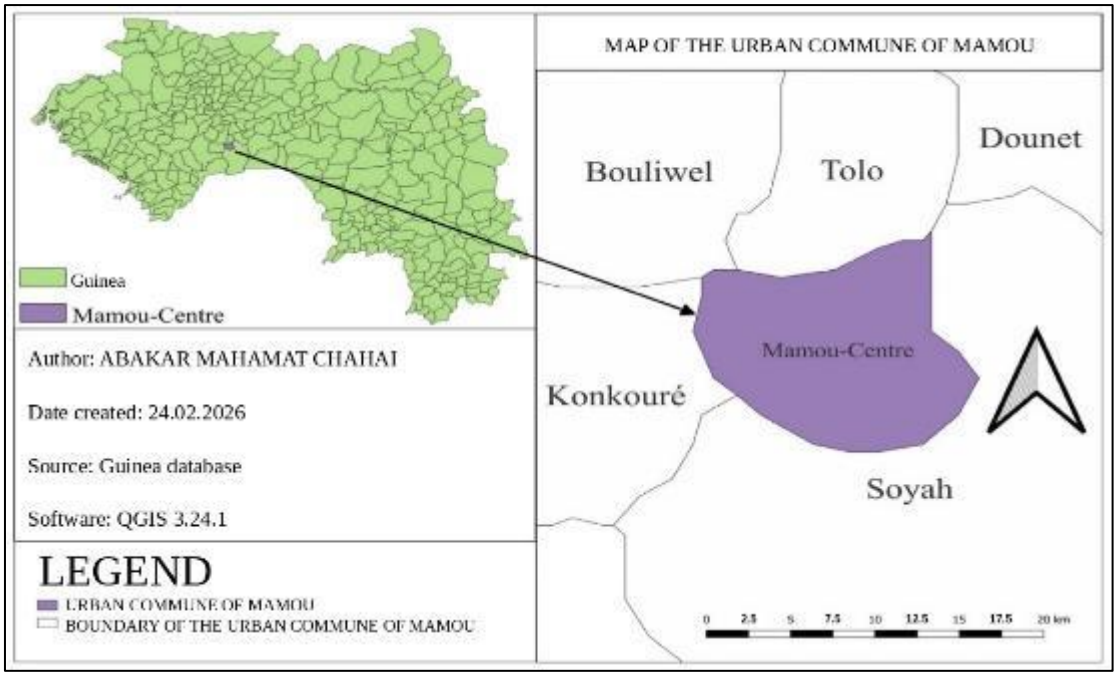

Figure 1: Map of the urban commune of Mamou

2.1.1 Study type and population

This was a cross-sectional, descriptive study with an analytical aim, conducted from 1st August to 2 September 2025 and targeting mainly cattle in the urban commune of Mamou.

2.1.2 Inclusion and exclusion criteria

Cattle older than 3 months located in the study area, whose owners gave their verbal consent, were included in this study. Cattle younger than 3 months and those whose owners refused to take part in the study were not included.

2.2 Field data collection techniques

2.2.1 Interviews with the heads of the veterinary services in the study area

Data collection began by contacting the Prefectural Directorate of Livestock (DPE) of Mamou regarding the existence of the disease in the commune, and by consulting the archives in search of historical data on the disease. Random sampling was then carried out to select the study sites. Out of 25 neighbourhoods and three districts, 10 neighbourhoods and 2 districts were drawn at random: Kimbely 1, Telico, Tambassa, Almamya Dunez, Hamdalaye, Saabou, Petelle, Koumi, Séré, Bouawann, Madina km 15 and, finally, Pellele.

2.2.2 Interviews with livestock farmers

In this study, 12 livestock farmers were interviewed using a knowledge, attitudes and practices (KAP) survey in order to assess their level of knowledge of foot-and-mouth disease, in particular regarding clinical signs, the preventive measures implemented in herds, the farming system, animal feeding methods, and livestock trading conditions and practices.

2.2.3 Sampling

Sampling was probabilistic and carried out on a voluntary basis. It began with a census of all livestock farmers in the commune of Mamou and of the authorities in charge of livestock in the study area. A three-stage sampling design was used. The clusters constituting the stages were, respectively, villages and towns, considered as the primary epidemiological unit (EU), cattle farms or herds as the secondary EU, and the animals as the tertiary EU.

The **Schwartz** formula allowed us to determine the sample size

The following simple formula was used: $n = \frac{Z^2 x P(1-P)}{d^2}$

Where n = sample size,

Z = Z statistic for a given confidence level (Z = 1.96 for 95% CI)

P = expected prevalence (P = 50%; (Jones et al., 2025)).

d = desired precision (d = 8.9%).

$$n = \frac{(1.96)^2 x 0.5(1-0.5)}{(0.089)^2} = 121.24$$

Hence, the minimum size of our sample was 121 samples, to be collected in the urban commune of Mamou.

2.2.4 Sample collection and serum harvesting method

A 2–4 mL blood sample was taken from each animal by puncture of the saphenous vein using a Venoject® needle with Vacutainer® tubes, performed by a member of the team.

2.3 Laboratory method for serum analysis

Serum antibodies against the FMD virus were sought in the sera using the NSP competition ELISA test (Non-Structural Protein (NSPscreen®) Competition, marketed by Innovative Diagnostics IDvet). These analyses were carried out at the Central Veterinary Diagnostic Laboratory of Conakry (LCVD).

2.3.1 Non-structural protein (NSP) ELISA procedure

The non-structural protein (NSP) ELISA was performed according to the following protocol. An amount of dilution buffer 18 (Buffer 18) was first poured into a reagent reservoir, and 50 µl of this buffer was then dispensed into all wells of the plate. Next, 30 µl of the positive control was added to wells A1 and B1, while 30 µl of the negative control was added to wells C1 and D1. Then, 30 µl of serum was added to the remaining wells of the plate. The plate was covered with aluminium foil and incubated at 37 °C for 2 hours. After incubation, the plate underwent five automatic wash cycles. A conjugate solution, prepared beforehand and stored at 4 °C, was dispensed at 100 µl per well, and the plate was then covered and left at room temperature for 30 minutes, followed again by five automatic washes. The plates were then placed under a hood in the dark, where 100 µl of substrate was added to each well; after 15 minutes of incubation at room temperature, the reaction was stopped by adding 100 µl of stop solution per well. Finally, the plate was placed in

the ELISA reader to read the results, which were exported using a USB flash drive and then transferred to a computer for interpretation of the results.

2.3.2 Data processing and analysis

Graphs and tables were produced using Microsoft Excel 2016. The seroprevalence proportions of foot-and-mouth disease were compared using the Chi-square test, and R software (version 4.4.2, 2024) was used for data processing and analysis, allowing more in-depth statistical analyses and reliable results for epidemiological interpretation. A threshold of OR > 1 was considered to indicate risk factors.

3 RESULTS

3.1 Sociodemographic characteristics

In this study, male livestock farmers accounted for 92% and females for 8%. The 41–50 age group was the most represented (58%), followed by the 31–40 and over-50 groups, each at 16.66%. By level of education, 58% had no schooling, and 16.67% had a secondary or university level of education. In terms of occupation, livestock farmers accounted for 33.33%, followed by traders at 25%, while veterinarians accounted for only 8.33%.

Table 1: Sociodemographic characteristics

Characteristics	Number	Frequency %
Sex		
Male	11	91.67
Female	01	8.33
Age group (years)		
20-30	01	8.33
31-40	02	16.67
41-50	07	58.33
50 and above	02	16.67
Educational level		
None	07	58.33
Primary	01	8.33
Secondary	02	16.67
University	02	16.67
Occupation		
Trader	03	25
Livestock farmer	04	33.33
Veterinarian	01	8.33
Farmer-livestock farmer	04	33.33

This low level of education may negatively influence the adoption of health prevention measures.

This predominance of livestock farmers and traders, key players in animal movements and contacts, favours the spread of the foot-and-mouth disease virus and may contribute to the seroprevalence observed in the urban commune of Mamou.

3.2 Knowledge of foot-and-mouth disease

In order to assess livestock farmers' level of knowledge of foot-and-mouth disease, investigations were carried out among farmers. It emerged that 75% of farmers do not know the disease**,** versus 25% who know it.

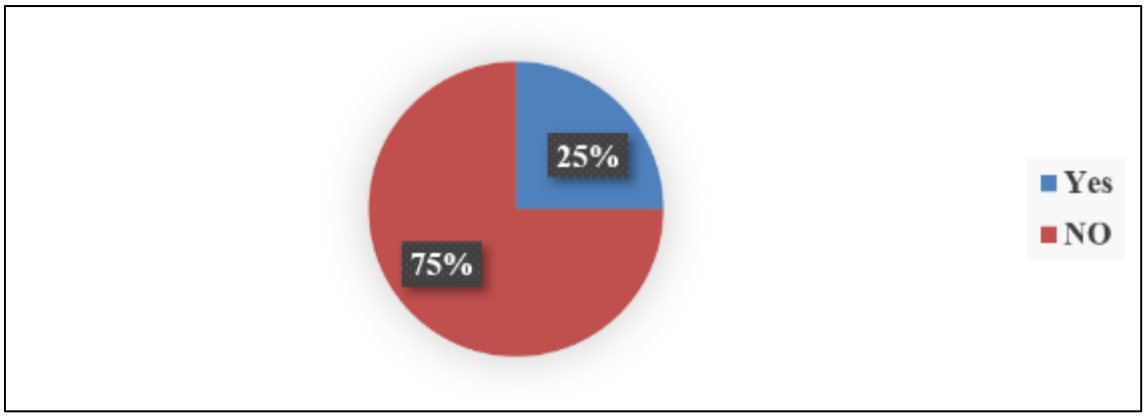

Figure 2: Knowledge of the disease

This low level of knowledge may be explained by limited access to information and to animal health training, insufficient veterinary awareness campaigns, as well as by the sometimes non-specific clinical signs of the disease, which make it difficult for farmers to identify. This shows the need to strengthen awareness-raising and veterinary support in order to optimize the prevention and control of the disease.

3.3 Determination of overall prevalence

The overall seroprevalence of foot-and-mouth disease by the NSP ELISA method was 10.74% in the urban commune of Mamou.

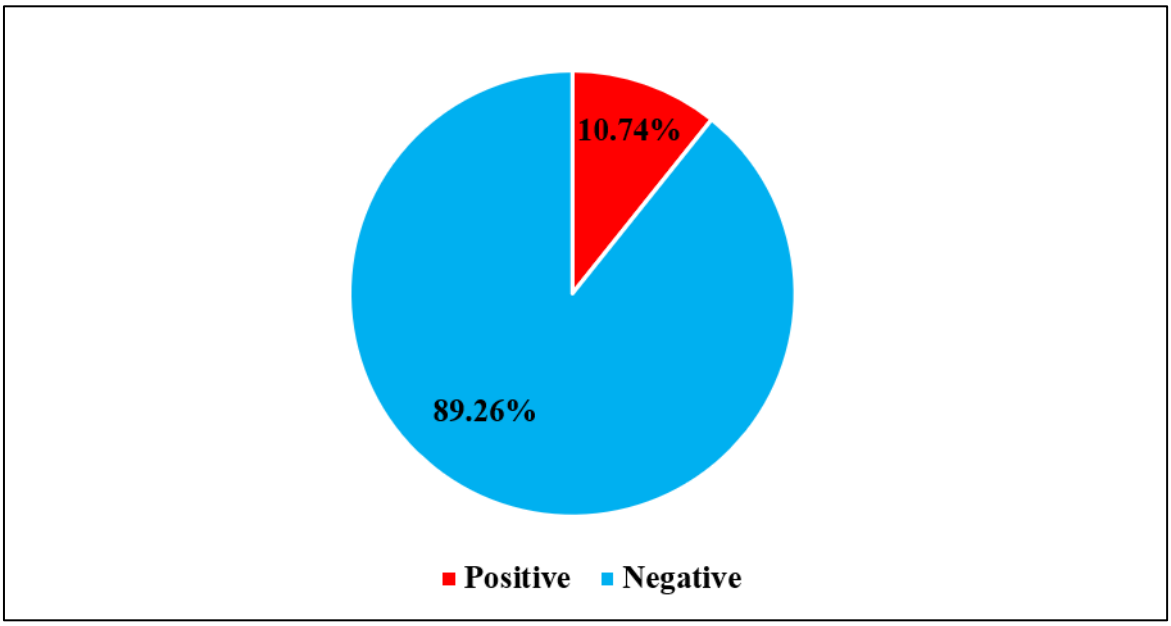

Figure 3: Overall prevalence of FMD in the urban commune of Mamou

This prevalence may be explained by the high contagiousness of the virus, frequent contact between animals on pastures and at water points,, as well as by the herd mobility and insufficient prevention measures such as vaccination.

3.4 Determination of foot-and-mouth disease seroprevalence by locality

This table shows that Madina Km 15 has the highest positivity rate (36.36%), followed by Koumi, Saabou and Telico (20% each). Pellele, Séré and Tambassa have lower rates (10%), while Séré, Petelle, Kimbely, Hamdalay and Bowal Wanou recorded no positive cases.

Table 2: Seroprevalence by locality

Locality	No. tested	Seropositive	Rate %	95% CI	X^2
Séré	10	1	10	0-28.6	1.86
Bouawann	10	0	00	-	
Hamdalaye	10	0	00	-	
Kimbely	10	0	0.00	-	
Koumi	10	2	20	2.5-55.6	
Madina Km 15	11	4	36.36	7.92–64.80	
Pellele	10	1	10	0-28.6	
Petelle	10	0	00	-	
Saabou	10	2	20	2.5-55.6	
Almamya Dunez	10	0	00	-	
Tambassa	10	1	10	0-28.6	
Telico	10	2	20	2.5-55.6	
Total	121	13	10.74	5.2-16.3	

These variations may be explained by herd density, contacts between animals on pastures or at water points, and cattle mobility. However, no statistically significant difference was observed between the areas, which suggests possible circulation of the disease throughout the study area.

3.5 Determination of seroprevalence by sex

The seroprevalence of foot-and-mouth disease virus was 13.98% [95% CI, 6.9–21%] among the females sampled. No male sample was positive (0%).

Table 3: Seroprevalence by sex

Sex	Samples tested	Positive	Seroprevalence %	95% CI	X^2	OR	P-value
Male	28	0	00	-	0.24	9.56	0.036
Female	93	13	13.98	6.94-21.02			
Total	121	13	10.74	5.23-16.25			

From the analysis of this table, it can be seen that all the positive samples come from females. This shows a dependence of seroprevalence on sex, with a significant association (P = 0.036).

3.6 Seroprevalence by age group

The seroprevalence of foot-and-mouth disease by age class of the cattle sampled was 3.85% [95% CI, 0–9.1%] in young animals under 5 years of age and a higher seroprevalence of 15.94% [95% CI, 7.3–24.6%] in adult cattle over 5 years of age, with a statistically significant difference (P-value = 0.015).

Table 4: Seroprevalence by age group

Age group	Samples tested	Positive	Seroprevalence (%)	95% CI	X^2	OR	P-value
4 months – 4 years	52	2	3.85	0-9.08	0.030	4.7	0.015
5 years and older	69	11	15.94	7.30-24.58			
Total	121	13	10.74	5.23-16.25			

From the analysis of Table 9, it can be seen that seropositivity is low

3.7 Risk factors associated with foot-and-mouth disease

The overall seroprevalence observed in this study is 10.74% (13/121). A significant association was observed with sex and age. Regarding age, cattle aged 5 years and older have an approximately 4.74-fold higher risk of being seropositive than those aged 3 months to 4 years (OR = 4.74; 95% CI: 7.30–24.58%; P = 0.015).

Table 5: Analysis of risk factors associated with bovine foot-and-mouth disease

Risk factor	**Category**	**Number**	**Seropositivity %**	**OR**	**X^2**	**95% CI**	**P-value**
Sex	Male	28	00	9.56		-	0.036
	Female	93	13.94		4.39	6.94-21.02	
Age group	3 months–4 years	52	3.85	4.74	4.53	0-9.08	0.015
	≥ 5 years	69	15.94			7.30-24.58	
Total	-	121	10.74			5.23-16.25	

4 DISCUSSION

The serological analysis of 121 bovine serum samples in the urban commune of Mamou, using the NSP ELISA test, revealed 13 positive samples, i.e. an overall seroprevalence of 10.74% [95% CI: 5.23–16.25%]. This rate, although moderate, shows that foot-and-mouth disease virus has indeed been circulating in the cattle population studied, in the absence of visible clinical manifestations. This observation suggests the presence of subclinical infections, indicating a silent endemicity of the virus and persistent transmission in the herd. These results are consistent with those obtained by [8] in Ethiopia, where a total of 389 serum samples were collected from cattle in four districts of the north-west of the Amhara region and analysed by a 3ABC ELISA test. The overall seroprevalence of foot-and-mouth disease virus was 5.66% (22/389) [95% CI: 3.34% to 7.98%]. This disparity could be explained by the sample size, the variability of farming practices, and ecological factors likely to influence the dynamics of viral transmission. The spatial analysis of seroprevalence reveals marked heterogeneity between the localities of the study area. The district of Madina Km 15 recorded the highest rate, 36.36% [95% CI: 7.92–64.80%], which could be attributed to a high animal density favouring inter-herd contact. Conversely, areas such as Pellele, Séré and Tambassa show low rates of 10%, reflecting more limited viral circulation. The localities of Koumi, Saabou and Telico show intermediate values of 20%. This uneven distribution highlights the combined influence of ecological conditions, farming system and animal mobility on the spread of the virus. Similar trends were reported by [9] in Chad, who reported high seroprevalences in areas where pastures are shared by several herds and on farms practising mixed livestock farming (cattle, sheep and goats). The analysis of risk factors associated with bovine foot-and-mouth disease shows a significant association with sex and age. By sex, seropositivity was observed exclusively in females, who have a 9.56-fold higher risk of being seropositive than males (OR = 9.56; 95% CI: 6.9–21.02%, P = 0.036), with no cases in males. This distinction could be linked to the demographic structure of herds, characterised by a small number of males in the herds, but also by the prolonged retention of females in the herds. However, our results differ from those of [10] in Ethiopia, who observed a higher prevalence in males (15.7%) than in females (8.27%), suggesting greater exposure of males to the virus, notably during movements for natural mating or trade. These divergences confirm that sex is a risk factor that varies according to farming contexts, management practices and local environmental conditions. The analysis by age class shows that cattle aged 5 years and older have a 4.74-fold higher risk of being seropositive than those aged 3 months to 4 years (OR = 4.74; 95% CI: 7.30–24.58%; P = 0.015). This suggests a risk of exposure to foot-and-mouth disease virus through grazing and transhumance, in contrast to young animals, which benefit from maternal antibodies and limited movement. These results are consistent with those of [11] in Ethiopia, who showed seroprevalence increasing with age, with old animals, adults and young animals showing rates of 39.1%, 24.0% and 8.0%, respectively; with seroprevalence (OR = 6.3% [95% CI: 2.9–13.6%]). The result in Figure 2 shows that 75% of farmers do not know the disease**,** versus 25% who know it**.** This low recognition of foot-and-mouth disease points to the low level of education, the presence of a subclinical form of the disease in herds that makes it difficult to detect, as well as insufficient training and awareness in animal health. Our results are similar to those of [12] in Somalia, which revealed that, concerning farmers' attitudes and practices towards the disease, 19% recognised the infection versus 81% who do not know it.

5 CONCLUSION

The results obtained show the existence of a seroprevalence indicating circulation of the virus within cattle herds in the urban commune of Mamou. This situation could be linked to several factors favouring transmission of the disease, notably herd mobility and insufficient health prevention measures.

This study highlights the need to strengthen epidemiological surveillance, to raise farmers' awareness of biosecurity measures, and to promote control strategies such as vaccination, in order to limit the spread of the disease and its economic consequences for livestock farming in Guinea.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

Abakar Mahamat CHAHAI designed this research project with financial support from the Institute for Livestock Research for Development (IRED) in N'Djamena. We would like to thank the IRED, Higher Institute of Veterinary Science and Medicine of Dalaba (ISSMV), Prefectural Directorate of Livestock (Direction Prefectoral de Livestock and the Central Veterinary Diagnostic Laboratory of Conakry (LCVD).

Funding Source

This study was made possible through the financial support of the CHAHAI family, who financed the data collection mission and provided the laboratory analysis kits.

Disclosure of conflict of interest

The authors declare that they have no conflicts of interest related to this study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Author Contribution Statement

AMC conceived the article project and wrote the first draft of the manuscript. YK, LK, and NKA contributed to the critical revision of the document. NKA and AMC performed statistical analyses. The authors proofread, corrected, and validated the manuscript.

REFERENCES

[1] Duchatel, F., Bronsvoort, B. M. D. C., & Lycett, S. (2019). *Phylogeographic Analysis and Identification of Factors Impacting the Diffusion of Foot-and-Mouth Disease Virus in Africa*. *7*(October). https://doi.org/10.3389/fevo.2019.00371

[2] Dahourou, L. D., Sanfo, K., Kadja, M. C., & Traore, A. (2022). *Caractérisation épidémiologique , clinique et financière de l ' épizootie de 2018 de la fièvre aphteuse dans les élevages bovins au Burkina Faso* [English translation: Epidemiological, clinical and financial characterisation of the 2018 foot-and-mouth disease epizootic in cattle farms in Burkina Faso]. *10*(4), 589–593.

[3] Ouagal, M., Brocchi, E., Grazioli, S., Ben Youssef, A., Sumption, K., Kiram, D., Oussiguere, A., Hendrikx, P., Berkvens, D., & Saegerman, C. (2018). Study on seroprevalence and serotyping of foot and mouth disease in Chad. *OIE Revue Scientifique et Technique*, *25*(3), 1–25. https://doi.org/10.20506/rst.37.3.2897

[4] Eddine, L. S. (2022). *Étude contributive de l ' effet de la fièvre aphteuse chez les vaches sur la qualité et la production de lait en l ' Algérie* [English translation: Contributory study of the effect of foot-and-mouth disease in cows on milk quality and production in Algeria]. (October), 10–11. https://doi.org/10.1111/tbed.12072

[5] OIE. (2020). Situation actuelle de la santé animale dans le monde : analyse des événements et des tendances Service [English translation: Current world animal health situation: analysis of events and trends]. *Medecine Tropicale*, *1–28*(4).

[6] Sassa Mebanga, A., Tassouabe Baïkame, H., Moussa, M., Etchike Agnem, C., & Ndjonka, D. (2022). Séroprévalence et impact économique de la fièvre aphteuse dans les élevages bovins laitiers des régions septentrionales du Cameroun [English translation: Seroprevalence and economic impact of foot-and-mouth disease in dairy cattle

farms in the northern regions of Cameroon]. *International Journal of Biological and Chemical Sciences*, *16*(4), 1459–1474. https://doi.org/10.4314/ijbcs.v16i4.9

[7] Hassanein, R. T., Abdelmegeed, H. K., Abdelwahed, D. A., Zaki, A. G., Saad, A. S., Shahein, M. A., Afify, A. F., & Rohaim, M. A. (2024). Epidemiological and Genetic Insights of the Circulating Foot - and - Mouth Disease Virus Serotypes in Egypt. *Current Microbiology*, *81*(12), 1–11. https://doi.org/10.1007/s00284-024-03944-x

[8] Yirdaw, B., Jibril, Y., & Muluneh, A. (2024). Seroprevalence, Serotyping, and Associated Risk Factors of Foot and Mouth Diseases in Bovine in Western Amhara Regional State, North Western Ethiopia. *Biomedical Statistics and Informatics*, *9*(1), 1–8. https://doi.org/10.11648/j.bsi.20240901.11

[9] Izzedine, A., Aziz, A., Romey, A., Relmy, A., Gorna, K., Muñoz, F., Boisseau, S. B., Zientara, S., & Lancelot, R. (2019). *Seroprevalence and molecular characterization of foot - and - mouth disease virus in Chad*. 1–8. https://doi.org/10.1002/vms3.206

[10] Ullah, M., Li, Y., Munib, K., Rahman, H. U., & Zhang, Z. (2023). Sero-Epidemiology and Associated Risk Factors of Foot-and-Mouth Disease (FMD) in the Northern Border Regions of Pakistan. *Veterinary Sciences*, *10*(5). https://doi.org/10.3390/vetsci10050356

[11] Batu, G., Abera, Z., Wakgari, M., & Gazagn, E. (2025). Sero-Prevalence of Foot-and-Mouth Disease in Cattle in Selected Districts of Jimma Zone, South-Western Ethiopia. *Veterinary Medicine and Science*, *11*(2). https://doi.org/10.1002/vms3.70239

[12] Barre, A., Mohamed, S. A., Mohamed, A. A., & Issack, Z. I. (2024). *Foot and Mouth Disease : Farmers , Knowledge , Attitude and Practice Direction to Pastoral Community in Lower Shabelle ,*. 1–8