Asian Journal of Medicine and Health

Volume 21, Issue 10, Page 253-262, 2023; Article no.AJMAH.105094
ISSN: 2456-8414

Detection of Elements of Transmission of Zoonotic Diseases in Kolwezi

I. E. Kasamba [a*], Kasongo Aimé [b], Nathalie Kaj Kayomb [b], Delly Ngoy Kabwe [b] and Malangu Mposhy [c]

[a] Department of Biomedical Sciences, Faculty of Medicine, University of Lubumbashi, Congo.
[b] School of Public Health, University of Kolwezi, Congo.
[c] Faculty of Veterinary Medicine, University of Lubumbashi, Congo.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJMAH/2023/v21i10900

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/105094

Original Research Article

Received: 09/06/2023
Accepted: 16/08/2023
Published: 22/08/2023

ABSTRACT

The purpose of this study was to detect in the communes of the city of Kolwezi, the elements of transmission of zoonotic diseases, it is appropriate to note the low supply of veterinary services and the poor management of animals, their excrement, and their corpse and misuse of antibiotics during the process of raising or treating animals.
Although aware of the risk of disease transmission by animals, the population does not take any protective measures and does not notice in the event of a spontaneous termination of pregnancy.
In view of this situation, public awareness on zoonotic diseases, animal management and all associated elements. A faculty of veterinary medicine is a necessity to improve the supply of veterinary services.

**Corresponding author: E-mail: kasambailunga@gmail.com;*

Keywords: Detection; zoonotic disease; transmission; Kolwezi.

1. INTRODUCTION

Most humans come into contact with animals in one way or another and some diseases of animal origin can be transmitted through a vector to infect humans.[1]; about 58–61% of human diseases are transmissible and up to 75% are zoonotic (borne from animals) [2,3]. Many exposures to zoonotic diseases occur in the home through direct or indirect contact with pets, agricultural animals, or livestock [4]. Due to the interaction of humans, animals, and the environment [5]. Often, clinical illness affects both the person and the animal, but sometimes the animal may appear healthy only to have a subclinical infection or colonization that can lead to illness in a person [6].

It is for the purpose of describing the collaborative effort between veterinarians, physicians, other health care professionals, and scientists to ensure the well-being of humans, domestic and wild animals, and their common environment. According to the One Heath viable approach [7,8], we conducted this study which set out to assess the risk of transmission of zoonotic diseases in the population of Kolwezi as an objective.

2. METHODOLOGY

This is a cross-sectional study among the inhabitants of the city of Kolwezi on the risk of transmission of zoonotic diseases. A total of 618 households were visited and results, were analyzed using Epi info 7.3 and Office Excel 2013 and presented in pie and bar charts.

3. RESULTS AND DISCUSSION

The animals observed in the household plots of the communes of Kolwezi were as follows: dogs 21%; Chickens 19% Cat 18%, Goats 9%, Duck, rabbit and mouse 6% each, guinea pig, ox, sheep, turtle, sign, frogs.

The spaces that animals occupy in human societies is the subject of increasing attention from researchers, propelled by the development of human-animal studies [9]. pets can carry zoonoses, owning and caring for animals can benefit human health. Pets are not a major source of human infections, but they can transmit certain diseases to humans. This transmission is usually complex, requiring close contact with domestic animals or their excretions and frequently involves a violation of good hygiene practices [10].

Offers of veterinary services for animals are accepted by the population for domestic animals at 39.1% for dogs, cats (20.38%), breeding chickens (16.1%); Chever (10.032%), sheep (9.87%), rabbit (8.73%), guinea pig (6.95%), ox (2.5%) and monkey (1.4%) and 0% for ducks.

One of the main challenges of the survey was to have access to veterinary professionals, it is fitting to note a low rate of intervention by veterinarians. Several reasons can explain this situation, the main one of which could be the low availability of veterinary services. This disparity may reflect a difference in expectations between clients and veterinary professionals about the level of service or expertise available [11]. This is contrary to the wishes of Goins M, Hanlon AJ who state: "The concerns of veterinary professionals regarding the health and welfare of exotic animals largely mirrored those of pet owners" [12]. Thus, the most common concerns of veterinary professionals regarding the welfare of domestic animals are related to the lack of knowledge of the owner as well as the lack of veterinary knowledge and accessible resources giving rise to problems of nutrition, the environment, and clinical disease follow –ups [11].

The reason for using antimicrobials, for disease treatment, or for growth or for disease prevention, differs from animal to animal. It should be noted that antibiotics are used in all domestic animals for these three reasons.

Antibiotic use in animals is the primary cause of selection and spread of antimicrobial resistance in animals [13]; While nowadays the number of pets has increased dramatically and more effort is put into pet welfare, which means higher levels of treatment for sick animals and more frequent use. antibiotics for pets [14]. indeed, animal health care is involved in the AMR problem. Because animals have the potential to function as reservoirs of resistant organisms through their close physical contact with humans [15], this is all the more evident for skin pathogens [16], which is an increased risk of transmission of resistant microorganisms between humans and their farts [17].

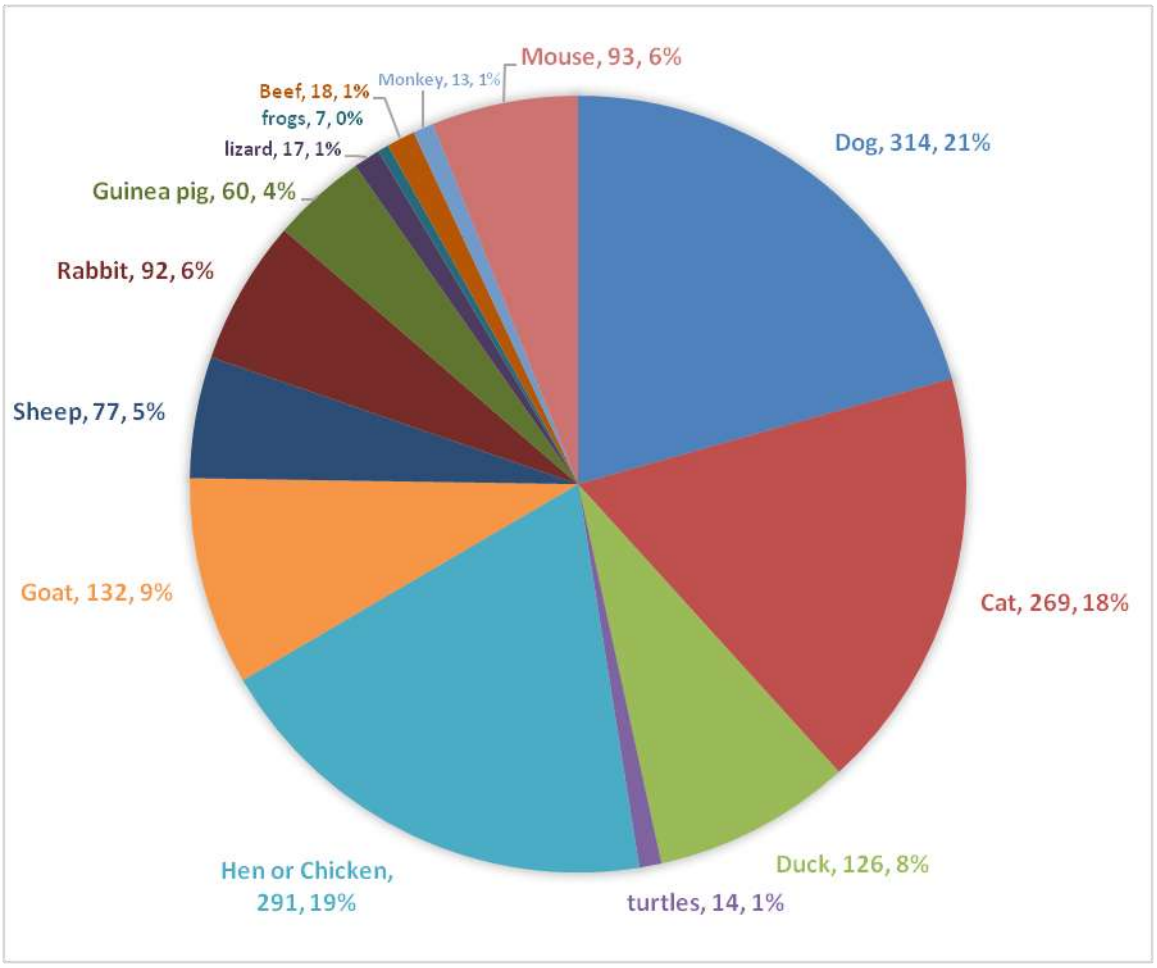

Fig. 1. Animals observed in households.

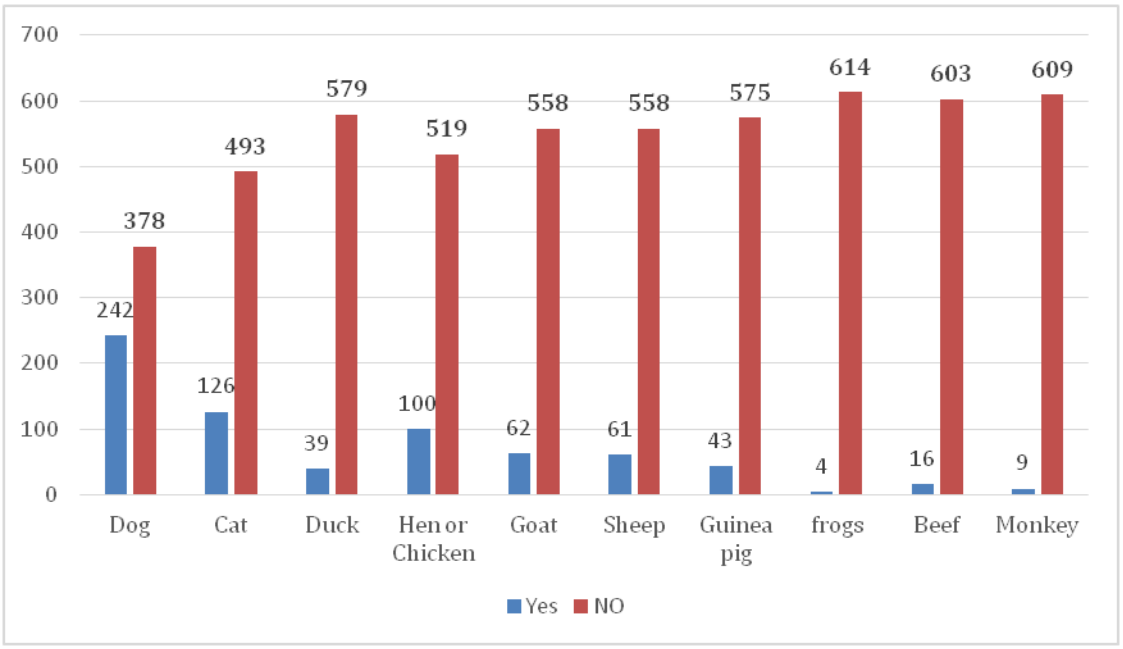

Fig. 2. The state of follow-up of animals by the veterinary service

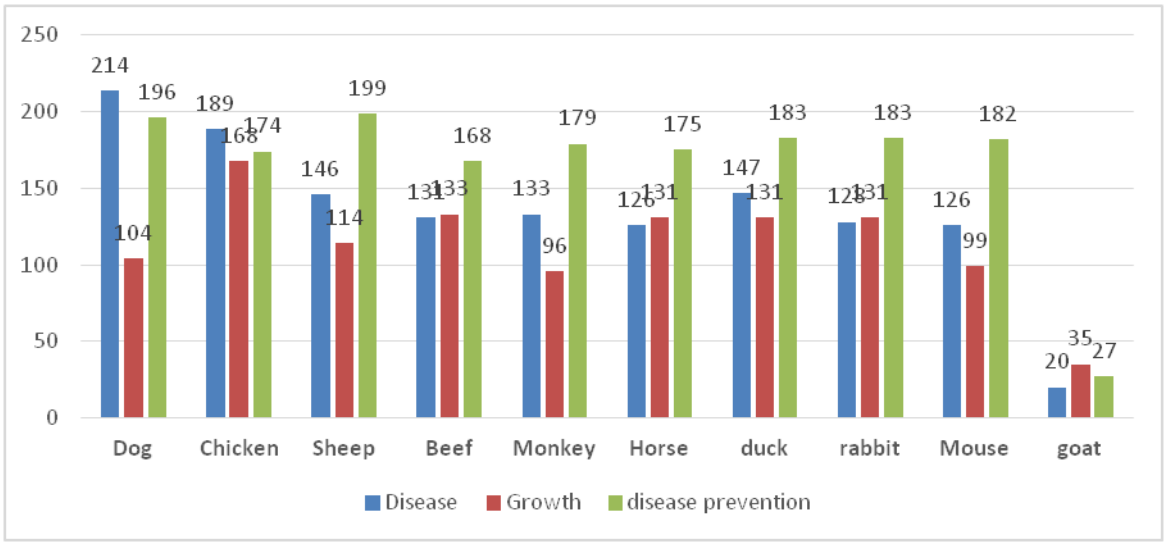

Fig. 3. Reason for using antimicrobials

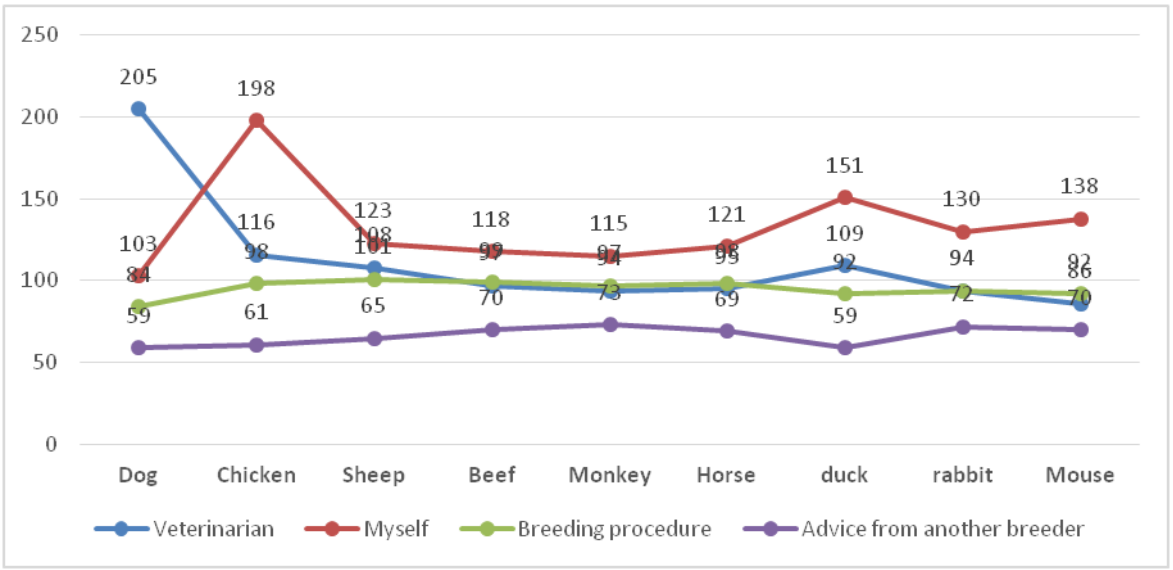

Fig. 4. Quality of the prescriber

The veterinarian prescribes these antimicrobials to treat the dogs, by the breeder during the rearing of the hens and some believe that the use of antibiotics is part of the breeding procedure. Obviously, the effective use of antibiotics in animal health depends on animal owners and their collaboration with prescribing veterinarians. Animal owners negotiate the treatment of their animals; they control the use of antibiotics and other actions that can directly determine the potential for RAM in their animals [18]. However, the breakdown in communication between veterinarian and owner, lack of awareness of AMR, and lack of opportunity or ability to discuss AMR are them to misinterpret each other's intentions, which may lead to unnecessary prescribing and inappropriate antibiotic use [19].

Ticks have been observed in all domestic animals and in dogs, chickens, and cats. To fight against ticks, the use of non-conventional recommended products is more frequent, followed by conventional insecticides. Some resort to antibiotics and antiseptics.

The increase in the prevalence and transmission of tick-borne diseases is a significant public health concern [20]. Ticks are common blood-sucking ectoparasites of medical and veterinary

importance that readily infect a variety of vertebrate hosts, including dogs, cats, and humans [21], these ticks are, in addition, the vectors of various pathogens, many of which are zoonotic apart from skin trauma and blood-feeding anemia in animals [22] and as in our results, several tick-borne pathogens are readily transmitted to dogs and cats [23]. These are Ixodids (hard ticks) and Argasids (soft ticks). Ixodid ticks are characterized by the presence of a distinct hard sclerified plate on the back called the scutum, with or without ornamentation, and a capitulum (mouthparts) that extends forward from the idiosoma (body) [24].

Tick-borne diseases depend on the interactions between the tick, the pathogen, and the vertebrate host. To be a competent vector, the tick must control the pathogen population through its innate immunity and the tick microbiome seems to contribute to this control. Upon inoculation of the pathogen into the skin, tick saliva modulates the pharmacology and immunology of the vertebrate host. Cutaneous immunity plays a significant role in tolerance to tick-borne pathogens [25].

The epidemiology, clinical features, diagnosis, and treatment of the diseases they cause. Although detection by molecular or immunological methods has improved, tick-borne diseases remain underdiagnosed, making the magnitude of the problem difficult to assess [20]. Knowledge of diseases that can be transmitted by ticks in specific locations is essential for detection and the selection of appropriate treatment. As tick-borne pathogens are discovered and emerge in new geographic regions, our ability to detect, describe and understand the growing threat to public health must also grow to meet the challenge.

82% of the population knows that animals can transmit diseases to humans and the signs of diseases observed in animals are respectively distributed in descending order as follows: Death, fatigue, diarrhea, sleep and cough; Iles observed that in most cases the population is surprised by the death of the animal and thus leaving a doubt as to the duration of exposure to the causative agent of the disease and the death of the animal. Because, clinical illness affects both the person and the animal, sometimes the animal may appear healthy only to have a subclinical infection or colonization that can lead to illness in a person [10].

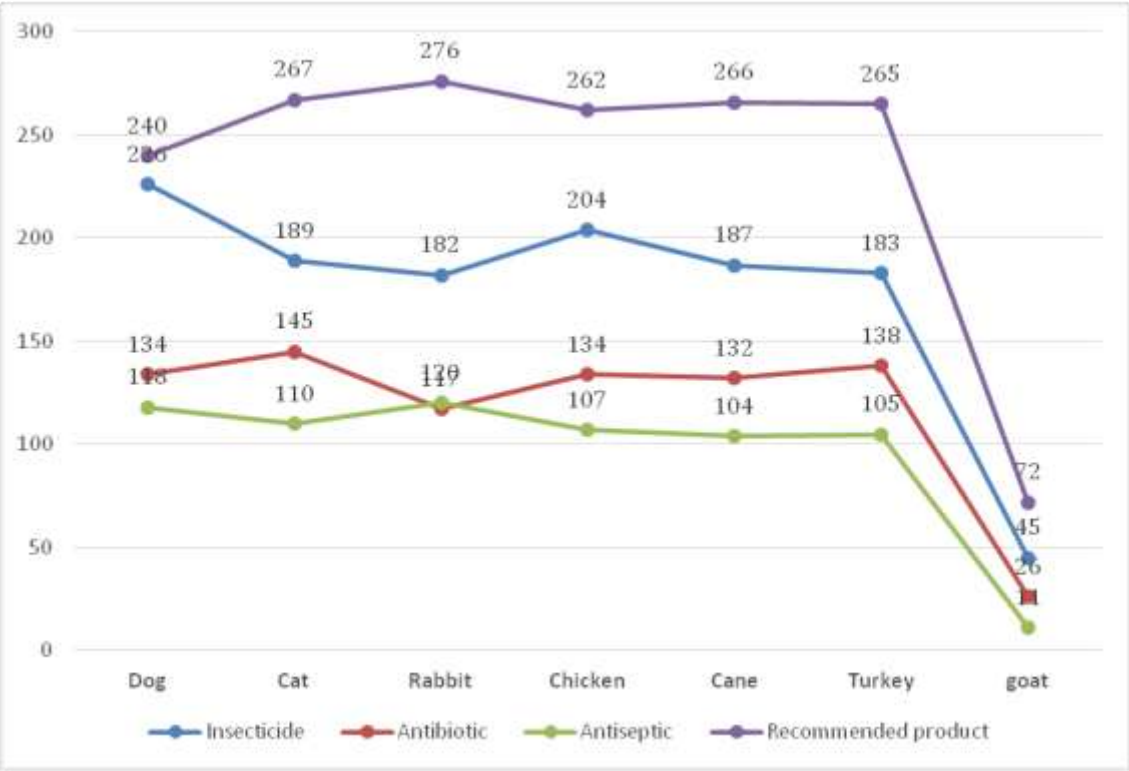

Fig. 5. Presence and Way to fight against ticks in my house

Discrete central nervous system (CNS) lesions resulting in well-defined neurological signs are not common in farm animals. Many diseases are characterized by diffuse neurological damage associated with bacteria, viruses, toxins, nutritional disorders and embryological defects, and the clinical signs of each disease are similar [26] and in our study fatigue is at least observed.

Abdominal pain can be detected by palpation and triggering of pain responses. However, it is difficult to decide whether referred pain occurs in animals. Diarrhea and constipation are the most frequently observed abnormalities in fecal consistency, composition, and frequency of defecation [27].

Animal excrement is managed as household waste in 70% of cases, 16% dump it in the toilets and 14% do not know how the staff removes it. As for the corpses of animals, 41% are thrown in the garbage, 38% are buried, 11% are consumed and 10%.

These diseases can be spread directly, through contact with infected animals; indirectly, through contact with contamination of the animal's environment with pathogens.

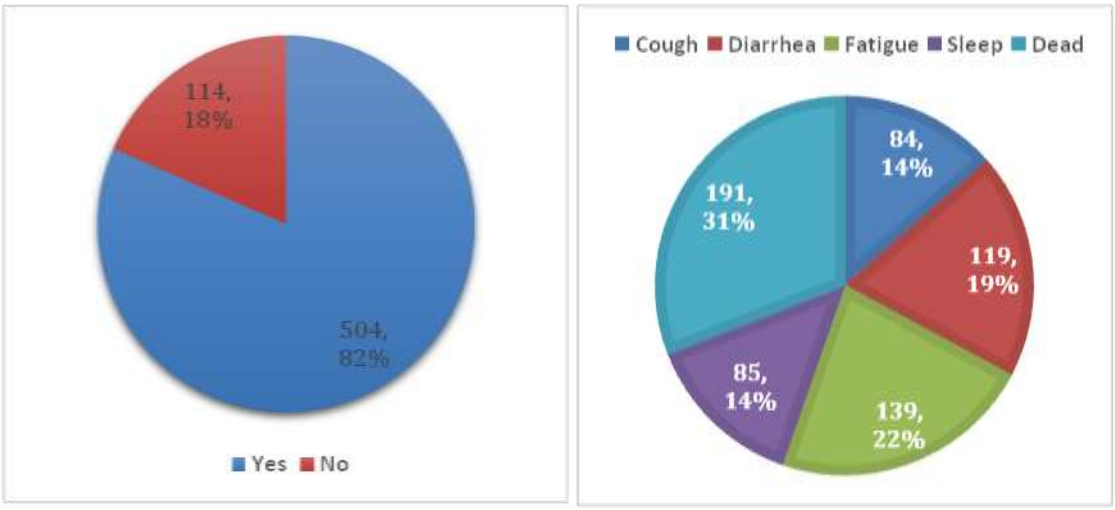

Fig. 6. Possibility of disease transmission and signs of disease observed in animals

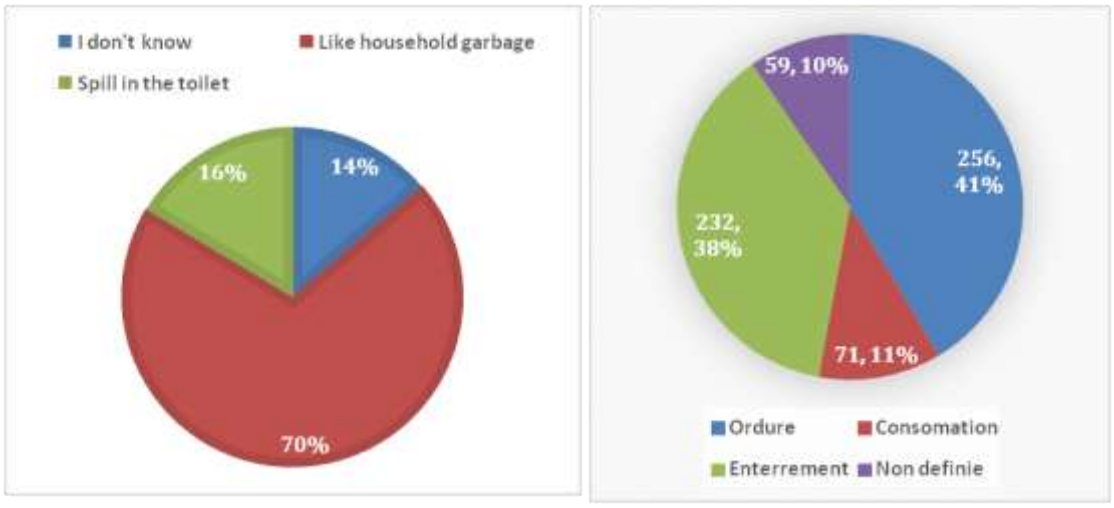

Fig. 7. Management of animal excrement and carcasses

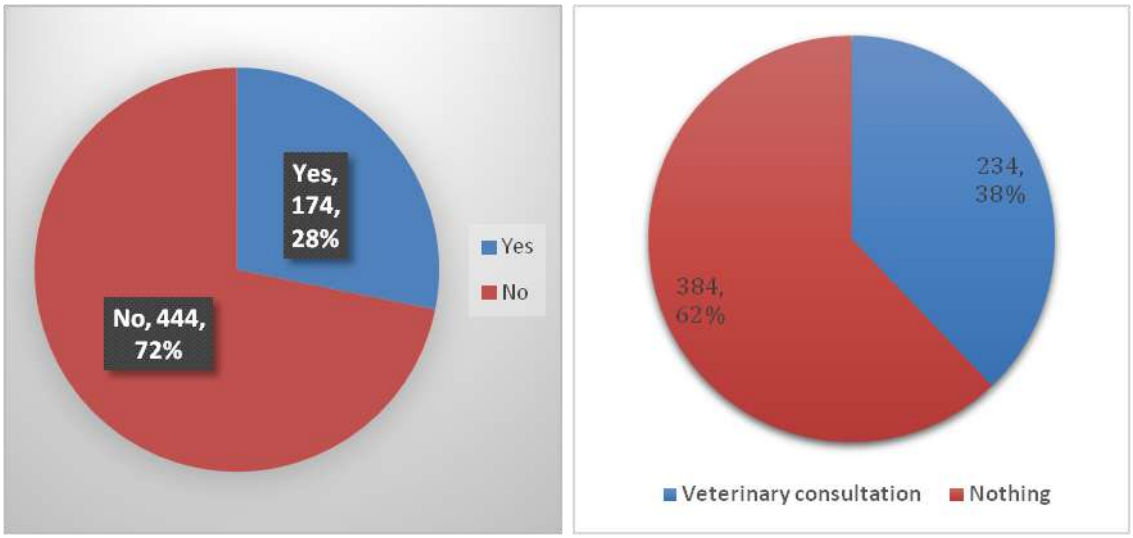

Fig. 8. Spontaneous abortion and medical consultatiion

Seventy-two percent of households have experienced unexplained abortions, and this is in a tick environment, studies have shown that keeping a domestic cat or dog during pregnancy was associated with an increased risk of AT. Additionally, owners of pets in close contact with their pets had a slightly higher risk of AT than those without close contact [28]. This could be partly explained by the fact that close contact with pets promotes more active transmission of diseases [29] including toxoplasmosis [10] and listeriosis, because, in fact, owning a pet increases the risk of infection with Listeria [30] whose unlimited proliferation, after intestinal translocation, is facilitated by the decrease in the immune level of women during pregnancy, in the liver and can lead to prolonged low-level bacteremia, leading to invasion of the gravid uterus, which is the preferred secondary target organ [31].

Pets are a major source of house dust allergens and endotoxins [32]. The latter has a direct link with adverse pregnancy outcomes [33,34]. Also, exposure of pets is likely to increase oxytocin concentrations in owners and alter gut flora, which may further cause threatened abortion [35,36].

4. CONCLUSION

This disease prevention and health promotion project is an alert to the risk of transmission of zoonotic diseases in the city of Kolwezi. The observation made by this study is very alarming and requires interventions at each level, both awareness and training. And in this regard and in view of the lack of supply of veterinary services, our plea is that of the need to open a faculty of veterinary medicine to mulch this situation. Also, the sensitization of the population as to the correct management of animals, their excrement and their bodies proves an absolute necessity and the school of public health which programs the course of one Heath should use the students for this purpose. Emphasis should be placed on effective preventive measures and rational use of antibiotics in animals to delay the development of antibiotic-resistant bacteria.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

Our thanks to the students of the second promotion of the school of public health of the University of Kolwezi who did the fieldwork as part of their zoonosis and one health.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Available:https://www.publichealthontario.ca/en/diseases-and-conditions/infectious-diseases/vector-borne-zoonotic-diseases , accessed 02-07-2023. 11:32 p.m

2. Al-Tayib OA An overview of the most significant zoonotic viral pathogens transmitted from animal to human in Saudi Arabia. Pathogens. 2019;8:25.
DOI: 10.3390/pathogens8010025. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
3. Ng V, Sargeant JM. A quantitative approach to the prioritization of zoonotic diseases in North America: A health professionals' perspective. PLOS ONE. 2013;8:e72172.
DOI: 10.1371/journal.pone.0072172. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
4. Aenishaenslin C, Hongoh V, Cissé HD, Hoen AG, Samoura K., Michel P, Waaub JP, Bélanger D. Multi-criteria decision analysis as an innovative approach to managing zoonoses: Results from a study on Lyme disease in Canada . BMC Public Health. 2013;13:897.
DOI: 10.1186/1471-2458-13-897. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
5. Varela K, Brown JA, Lipton B, Dunn J, Stanek D, et al. A Review of zoonotic disease threats to pet owners: A compendium of measures to prevent zoonotic diseases associated with non-traditional pets: Rodents and other small mammals, reptiles, amphibians, backyard poultry, and other selected animals. Vector Terminal Zoonotic Dis. 2022;22(6): 303-360.
DOI: 10.1089/vbz.2022.0022. PMID: 35724316; PMC ID: PMC9248330.
6. Day MJ. Pet-Related Infections. Am Fam Physician. 2016;94(10):794-802. PMID: 27929279.
7. Gibbs EP. The evolution of One Health: a decade of progress and challenges for the future. Vet Rec. 2014;174(4):85-91.
8. Day MJ. Human-animal health interactions: The role of One Health. Am Fam Physician. 2016;93(5):344-346.
9. Shapiro K., DeMello M. The state of human-animal studies. Soc. Anim. 2010;18:307–318.
DOI: 10.1163/156853010X510807. [CrossRef] [Google Scholar] [Ref list]
10. Rabinowitz PM, Gordon Z, Odofin L. Pet-related infections. Am Fam Physician. 2007;76(9):1314-22. PMID: 18019874.
11. Goins M, Hanlon AJ. Exotic pets in Ireland: 2 . Provision of veterinary services and perspectives of veterinary professionals on responsible ownership. Ir Vet J. 2021;74(1): 13 .
DOI: 10.1186/s13620-021-00191-5. PMID: 33947452; PMCID: PMC8096126.
12. B2 Goins M, Hanlon AJ. Exotic Pets in Ireland: 1 . Prevalence of Ownership and Access to Veterinary Services. Ir Vet J; 2021.
Available:10.1186/s13620-021-00190-6. [Ref list]
13. Sundsfjord A, Sunde M. Antibiotika til dyr og resistens hos baketerier fra dyr--betydning for menneskers helse [Antimicrobial resistance after antibiotic use in animals--impact on human health]. Tidsskr Nor Laegeforen. 2008; 128(21):2457-61. norway. PMID: 19096469.
14. Guardabassi L, Schwarz S, Lloyd DH. Pet animals as reservoirs of antimicrobial-resistant bacteria. J Antimicrob Chemother. 2004;54(2):321–332.
DOI: 10.1093/jac/dkh332. [PubMed] [CrossRef] [Google Scholar] [Ref list]
15. Committee for Medicinal Products for Veterinary Use (CVMP): Reflection paper on the risk of antimicrobial resistance transfer from companion animals. London: European Medicines Agency; 2013. [Ref list]
16. Walther B, Hermes J, Cuny C, Wieler LH, Vincze S, Abou Elnaga Y, Stamm I, Kopp PA, Kohn B, Witte W, et al. Sharing more than friendship--nasal colonization with coagulase-positive staphylococci (CPS) and co-habitation aspects of dogs and their owners. PLoS One. 2012;7(4):e35197.
DOI: 10.1371/journal.pone.0035197. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
17. Wieler LH, Ewers C, Guenther S, Walther B, Lubke-Becker A. Methicillin-resistant staphylococci (MRS) and extended-spectrum beta-lactamases (ESBL)-producing Enterobacteriaceae in companion animals: Nosocomial infections as one reason for the rising prevalence of these potential zoonotic pathogens in clinical samples. Int J Med Microbiol. 2011;301(8):635–641.
DOI: 10.1016/j.ijmm.2011.09.009. [PubMed] [CrossRef] [Google Scholar] [Ref list]
18. Lloyd DH. Reservoirs of antimicrobial resistance in pet animals. Clin Infect Dis. 2007;45(Supplement_2):S148–S152.

DOI: 10.1086/519254. [PubMed] [CrossRef] [Google Scholar] [Ref list]

19. Smith M, King C, Davis M, Dickson A, Park J, Smith F, Currie K, Flowers P. Pet owner and vet interactions: exploring the drivers of AMR. Antimicrobial Resist Infect Control. 2018;7:46.
DOI: 10.1186/s13756-018-0341-1. PMID: 29619213; PMCID: PMC5879597.
20. Madison-Antenucci S, Kramer LD, Gebhardt LL, Kauffman E. Emerging tick-borne diseases. Clin Microbiol Rev. 2020;33(2):e00083-18.
DOI: 10.1128/CMR.00083-18. PMID: 31896541; PMCID: PMC6941843.
21. Nicholson WL, Sonenshine DE, Noden BH, Brown RN, 2019. Chapter 27 - Ticks (ixodida). In: Mullen GR, Durden LA (Eds.), Medical and Veterinary Entomology, 3rd edition. Academic Press; 603–672. [Google Scholar] [List of references]
22. Centers for Disease Control and Prevention, 2018. Tickborne Diseases of the United States, 5th edition. Accessed 27 Oct 2020.
Available:https://www.cdc.gov/ticks/tickborneDiseases/TickborneDiseases-P.pdf
23. Little SE, Barrett AW, Nagamori Y, Herrin BH, Normile D, Heaney K, Armstrong R. Ticks from cats in the United States: patterns of infestation and infection with pathogens. Vet. Parasitol. 2018;257:15–20. [PubMed] [Google Scholar] [Ref list]
24. Saleh MN, Allen KE, Lineberry MW, Little SE, Reichard MV. Ticks infesting dogs and cats in North America: Biology, geographic distribution, and pathogen transmission. Vet Parasitol. 2021;294:109392.
DOI: 10.1016/j.vetpar.2021.109392. Epub 2021 Feb 19. PMID: 33971481; PMCID: PMC9235321.
25. Bonnet SI, Binetruy F, Hernández-Jarguín AM, Duron O. The tick microbiome: why non-pathogenic microorganisms matter in tick biology and pathogen transmission. Front Cell Infect Microbiol. 2017;7:236.
Available:10.3389/fcimb.2017.00236 [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
26. Diseases of the Nervous System. Veterinary Medicine. 2017;1155–370.
DOI: 10.1016/B978-0-7020-5246-0.00014-0. Epub 2017 Feb 10. PMCID: PMC7322266.
27. Diseases of the Alimentary Tract: Nonruminants. Veterinary Medicine. 2017;175–435.
DOI: 10.1016/B978-0-7020-5246-0.00007-3. Epub 2017 Feb 10. PMCID: PMC7167529.
28. Zhang Z, Yu Y, Yang B, Huang W, Zhang Y, Luo Y, Bloom MS, Qian Z, Arnold LD, Boyd R, Wu Q, Liu R, Dong G, Yin C, The China Birth Cohort Study Cbcs Group. Association between Pet Ownership and Threatened Abortion in Pregnant Women: The China Birth Cohort Study. Int J Environ Res Public Health. 2022 Dec 6;19(23):16374.
DOI: 10.3390/ijerph192316374. PMID: 36498445; PMCID: PMC9739756.
29. Ybañez R., Busmeon C., Viernes A., Langbid JZ, Nuevarez JP, Ybañez AP, Nishikawa Y. Endemicity of Toxoplasma infection and its associated risk factors in Cebu, Philippines. PLOS ONE. 2019;14:e0217989.
DOI: 10.1371/journal.pone.0217989. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
30. Abay S, Bayram LÇ, Aydin F, Müştak HK, Diker KS, Erol I. Pathogenicity, genotyping and antibacterial susceptibility of the Listeria spp. recovered from stray dogs. Microb. Pathog. 2019;126:123–133.
DOI: 10.1016/j.micpath.2018.10.037. [PubMed] [CrossRef] [Google Scholar] [Ref list]
31. Vázquez-Boland JA, Kuhn M, Berche P, Chakraborty T, Domínguez-Bernal G, Goebel W, González-Zorn B, Wehland J, Kreft J. Listeria pathogenesis and molecular virulence determinants. Clin. Microbiol. Rev. 2001;14:584–640.
DOI: 10.1128/CMR.14.3.584-640.2001. [PMC free article] [PubMed] [CrossRef] [Google Scholar] [Ref list]
32. Schoos AM, Nwaru BI, Borres MP Component-resolved diagnostics in pet allergy: Current perspectives and future directions. J. Allergy Clin. Immunol. 2021;147:1164–1173.
DOI: 10.1016/j.jaci.2020.12.640. [PubMed] [CrossRef] [Google Scholar]
33. Arenas-Hernandez M, Romero R, St LD, Hassan SS, Kaye EB, Gomez-Lopez N. An imbalance between innate and adaptive immune cells at the maternal-fetal interface occurs prior to endotoxin-induced preterm birth. Cell Mol. Immunol. 2016;13: 462–473.

DOI: 10.1038/cmi.2015.22. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

34. Gomez-Lopez N, Arenas-Hernandez M, Romero R, Miller D, Garcia-Flores V, Leng Y, Xu Y, Galaz J, Hassan SS, Hsu CD, et al. Regulatory t cells play a role in a subset of idiopathic preterm Labor/Birth and adverse neonatal outcomes. Cell Rep. 2020;32:107874.
DOI: 10.1016/j.celrep.2020.107874. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

35. Nagasawa M, Mitsui S, En S, Ohtani N, Ohta M, Sakuma Y, Onaka T, Mogi K, Kikusui T. Social evolution. Oxytocin-gauze positive loop and the coevolution of human-dog bonds. Science. 2015;348: 333–336.
DOI: 10.1126/science.1261022. [PubMed] [CrossRef] [Google Scholar]

36. Tun HM, Konya T, Takaro TK, Brook JR, Chari R, Field CJ, Guttman DS, Becker AB, Mandhane PJ, Turvey SE, et al. Exposure to household furry pets influences the gut microbiota of infant at 3–4 months following various birth scenarios. Microbiome. 2017;5:40.
DOI: 10.1186/s40168-017-0254-x. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/105094