# Article

## Letter to the editors

# A retrospective study on veterinary antimicrobial use in Nigeria, 2014 to 2017

**Dooshima Kwange, Mwapu Dika Ndahi, Olaniran Alabi, Bukar Ali Usman, Peter Umanah, Jens Kirk Andersen, Ayi Vandi Kwaghe**

**Corresponding author:** Ayi Vandi Kwaghe, Nigeria Field Epidemiology and Laboratory Training Programme, Zaria, Nigeria. hyelni_vandi@yahoo.com

**Cite this article:** Dooshima Kwange et al. A retrospective study on veterinary antimicrobial use in Nigeria, 2014 to 2017. Pan African Medical Journal. 2023;45(104). 10.11604/pamj.2023.45.104.32046

**Available online at:** https://www.panafrican-med-journal.com//content/article/45/104/full

**A retrospective study on veterinary antimicrobial use in Nigeria, 2014 to 2017**

Dooshima Kwange[1], Mwapu Dika Ndahi[1], Olaniran Alabi[1], Bukar Ali Usman[2], Peter Umanah[1], Jens Kirk Andersen[3], Ayi Vandi Kwaghe[1,4,&]

[1]Department of Veterinary and Pest Control Services, Federal Ministry of Agriculture and Rural Development, PMB 145, Area 11, Garki, Abuja, Nigeria, [2]National Agency for Food and Drugs Administration and Control, Plot 1, Isolo Industrial Estate, Lagos, Nigeria, [3]National Food Institute, Technical University of Denmark, Kemitorvet, Bygning 201, 2800 Kgs, Lyngby, Denmark, [4]Nigeria Field Epidemiology and Laboratory Training Programme, Zaria, Nigeria

[&]**Corresponding author**
Ayi Vandi Kwaghe, Nigeria Field Epidemiology and Laboratory Training Programme, Zaria, Nigeria

# To the editors of the Pan African Medical Journal

## Introduction

Global Reliable Data on Antimicrobial Use (AMU) in food animals was estimated at 63,000 tons annually in 2015 and is projected to increase by almost 70% in 2030 [1]. The global program on surveillance of antimicrobial consumption was launched in 2015 by WHO to tackle the problem of a lack of quality antimicrobial use (AMU) data and a standardized methodology for data collection [2]. Data on AMU is fundamental for countries to establish national and local antimicrobial stewardship programs [2]. Antimicrobial resistance (AMR) is a global threat to health and tackling AMR in animals through the aid of AMU information is a means of protecting public health.

The rise in global antimicrobial resistance [3] necessitates the need for the estimation of AMU in the country. This will aid policy decision-making regarding the use of antimicrobials and further give direction regarding the reasons behind specific antimicrobial resistance in the country. In developing nations like Nigeria, data on antimicrobials is underestimated due to the illegal import of drugs as a result of the porosity of our borders. This study aimed at determining the quantity and pattern of veterinary AM used in the country within the study period.

## Methodology

We conducted a retrospective study on the amount of active ingredients of antimicrobial agents intended for use in the animal sector using import data of the country from 2014 to 2017. We obtained data on antimicrobial agents for use in animals from the National Agency for Food and Drug Administration and Control (NAFDAC). Obtained data include; date of importation, name of importing company, name of exporting company, product name, quantity imported. All antimicrobial agents were grouped into the various classes and their active ingredients were calculated. In 2014 and 2015, AM with more than one molecule were calculated as aggregated whereas in 2016 and 2017, AM agents having more than one active ingredient were disaggregated into their respective classes and the amount of active ingredients were calculated. Data for 2014 was for 7 months only.

**Data analyses:** data was collected, collated, analysed, and converted to kilograms as described by Office International des Epizooties (OIE) [4]; active ingredients present in the form of compounds or derivatives, the mass of active entity of the molecules in International Units, were converted to kg [5]. The nomenclature of antimicrobial agents complied with international standards [4].

## Results

Eleven antimicrobial classes were imported for the period under review (2014 to 2017). These include; Tetracyclines (Oxytetracyclines and Chlortetracycline), Fluoroquinolones (Enrofloxacin, Ciprofloxacin and Norfloxacin), Macrolides (Tylosin, Erythromycin and Streptomycin), Penicillin (Amoxycillin and Penicillin), Sulfonamides (Sulfaquinoxalin, Sulfadimidine, Sulfadiazine and Trimethoprim), Polypeptides (Colistin sulphate), Aminoglycosides (Gentamycin and Neomycin), Amphenicols (Florfenicol), Glycopetides (Ancomycin), Pleuromutilins (Tiamulin) and Nitrofurantoin (Nitrofurantoin).

Nineteen antimicrobial had more than one active ingredient; Amoxycol (Amoxycillin and Colistin), Amoxystin (Colistin and Amoxycillin), Dimoxican (Colistin sulphate and Amoxycillin trihydrate), Tylodox (Tylosin and Doxycycline), Doxytyl (Doxycycline and Tylosin), Doxygen, Intergendox (Doxycycline and Gentamycin), Neodox (Doxycycline and Neomycin), Keproceryl (Oxytetracycline, Colistin and Erythromycin), Nemovit, Neotreat, Neo-oxy egg formular (Oxytetracycline and Neomycin), Koleridin

(Oxytetracycline and Neomycin), Trisulmix (Trimethoprime and Sulfamethioxine), Colisultrix (Trimethoprime and Colistin sulphate), EST Mix (Erythromycin, Sulfadiazine and Trimethoprime), Sulfa 3 (Sulfathiazole, Sulfadimidine and Sulfamerazine), Sulfavet (Sulphadimidine and Trimethoprime) and Ciprovet (Sulfur and Ciprofloxacin).

A total of 1,392,578 kg (1,392.6 tons) of antimicrobials were imported during the study period (Table 1). The year 2015 had the highest importation of antimicrobials (515,892 kg) then 2017 (338,878 kg) (Table 1). The highest imported class of antimicrobial was tetracycline (629,236 kg) followed by polypeptides (148,974 kg) and macrolides (132,712 kg) (Table 1).

**Discussion**

This report is similar to the global trend of AMU which tends to be decreasing [1]. During the four years, tetracycline (45.18%) accounted for most of the imported AM with almost 300 tons in 2017 followed by polypeptides (10.70%) and macrolides (9.53%) similar to a study in south-western Nigeria where stating tracycline's (33.6%) as the leading antimicrobial used in livestock production over the period of study [6]. Several reports from Africa, UK and OIE revealed tetracycline group as the most used antibiotic [7-9].

Nitrofurantoin and pleuromutilin were only imported in 2016. The use of antimicrobial agents in animal health has a potential of affecting human health through drug residues, as a result, Nitrofuran and Amphenicols were banned for use in livestock feed in many countries, including Nigeria (NAFDAC) [10]. This also indicates that the Nigerian government is adhering to the banning of these drugs hence the absence of their importation in subsequent years.

## Conclusion

Data on AMU in Nigeria for the study period was 1,392,578 kg (1392.6 tons). In Nigeria, AMU data is underestimated because antimicrobials produced locally, those purchased through informal markets and other sources such as veterinary clinics/hospitals and farms were not captured. This study demonstrates the need for collecting such data to improve on the current data collection system.

## Competing interests

The authors declare no competing interest.

## Authors' contributions

Bukar Ali Usman collected the data from NAFDAC. Dooshima Kwange, Mwapu Dika Ndahi and Ayi Vandi Kwaghe collated and analyzed the data. Mwapu Dika Ndahi drafted the manuscript and was edited by Jens Kirk Andersen. Ayi Vandi Kwaghe further developed the manuscript. Dooshima Kwange, Mwapu Dika Ndahi, Olaniran Alabi, Bukar Ali Usman, Jens Kirk Andersen, Peter Umanah and Ayi Vandi Kwaghe edited and approved the final version of the manuscript.

## Acknowledgements

We acknowledge NAFDAF for providing us with the data for this study. We acknowledge the Chief Veterinary Officer of Nigeria for his immense support to the AMR Programme (Animal Health Sector) in Nigeria and for encouraging us to publish this work.

## Table

**Table 1**: active ingredients (n=12) of antimicrobials imported to Nigeria, 2014-2017

## References

1. Boeckel TP Van, Brower C, Gilbert M, Grenfell BT, Levin SA. Global trends in antimicrobial use in food animals. Proc Natl Acad Sci U S A. 2015 May 5;112(18): 5649-54. **PubMed**| **Google Scholar**

2. Dall C. Nations vary widely in antibiotic use, WHO data show. Accessed on 9th September 2021.

3. O'Neill LJ. The Global Threat of Antimicrobial Resistance. Accessed on 9th October. 2021.

4. World Organisation for Animal Health. OIE Standards, Guidelines and Resolutions on Antimicrobial Resistance and the use of antimicrobial agents. Accessed on 9th September 2021.

5. Annex to the Guidance for Completing the OIE template for the collection of data on Antimicrobial Agents intended for use in Animals: Considerations on converting content of antimicrobial active ingredients in veterinary medicines into kilograms.

6. Adesokan HK, Akanbi IO, Akanbi IM, Obaweda RA. Pattern of antimicrobial usage in livestock animals in south-western Nigeria: The need for alternative plans. Onderstepoort J Vet Res. 2015;82(1)816. **PubMed| Google Scholar**

7. Kimera ZI, Mshana SE, Rweyemamu MM, Mboera LEG, Matee MIN. Antimicrobial use and resistance in food- producing animals and the environments: an African perspective. Antimicrob Resist Infect Control. 2020;9(37): 1-12. **PubMed| Google Scholar**

8. Medicines Directorate V. UK Veterinary Antibiotic Resistance and Sales Surveillance Report UK-VARSS 2017. 2018.

9. Bos M, Broadfoot F, Healey K, Pickering A, Vidal A, Anjum M *et al.* UK Veterinary Antibiotic Resistance and Sales Surveillance Report. Accessed on 9th September 2021.

10. National Agency for Food and Drug Administration and Control (NAFDAC). List of Banned Veterinary Drugs. Accessed on 9th October 2021.

| S/N0 | Class of Antimicrobial | 2014(Jun-Dec) Molecules in kg/ Percentage (%) | 2015 Molecules in kg/ Percentage (%) | 2016 Molecules in kg/ Percentage (%) | 2017 Molecules in kg/ Percentage (%) | Total Molecules in kg/ Percentage (%) |
|---|---|---|---|---|---|---|
| **Table 1**: active ingredients (n=12) of antimicrobials imported to Nigeria, 2014-2017 |
| 1 | Pleuromutilins | 0 (0.00) | 0 (0.00) | 2 (0.00) | 0 (0.00) | 2 (0.00) |
| 2 | Glycopeptides | 24 (0.01) | 40 (0.01) | 0 (0.00) | 0 (0.00) | 64 (0.00) |
| 3 | Nitrofurantoin | 0 (0.00) | 0 (0.00) | 243 (0.07) | 0 (0.00) | 243 (0.02) |
| 4 | Amphenicols | 268 (0.13) | 658 (0.13) | 0 (0.00) | 0 (0.00) | 926 (0.07) |
| 5 | Penicillins | 193 (0.09) | 0 (0.00) | 6569 (1.99) | 3624 (1.07) | 10386 (0.75) |
| 6 | Sulfonamides | 1060 (0.51) | 687 (0.13) | 6635 (2.01) | 11592 (3.42) | 19974 (1.43) |
| 7 | Fluoroquinolones | 5115 (2.47) | 3146 (0.61) | 13520 (4.09) | 3152 (0.93) | 24933 (1.79) |
| 8 | Aminoglycosides | 46 (0.02) | 131 (0.03) | 37341 (11.29) | 9052 (2.67) | 46570 (3.34) |
| 9 | Macrolides | 3349 (0.22) | 9798 (1.90) | 107775 (32.58) | 11790 (3.48) | 132712 (9.53) |
| 10 | Polypeptides | 459 (0.22) | 142333 (27.59) | 4290 (1.30) | 1892 (0.56) | 148974 (10.70) |
| 11 | Aggregated | 188339 (90.99) | 190219 (36.87) | 0 (0.00) | 0 (0.00) | 378558 (27.18) |
| 12 | Tetracyclines | 8147 (3.94) | 168880 (32.74) | 154433 (46.68) | 297776 (87.87) | 629236 (45.18) |
| Total | | 207000 (100.00) | 515892 (100.00) | 330806 (100.00) | 338878 (100.00) | 1392578 (100.00) |

*aggregated; antimicrobial agents with more than one molecule regardless of the antimicrobial class were calculated as aggregated (2014-2015)