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Data Article

Antimicrobial resistance dataset for pattern recognition in machine learning application

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A R T I C L E I N F O

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A B S T R A C T

This study presents a dataset of bacterial isolates collected from abattoirs in Osun State, Nigeria, designed to support research on antimicrobial resistance (AMR). The environment plays a critical role in the development and spread of AMR, posing a growing threat to global health. This dataset aims to address challenges in antibiotic selection by enabling the prediction of effective drugs for specific bacterial infections.

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Specification Table

Subject	*Microbiology*.
Specific subject area	Antimicrobial Resistance.
Type of data	Structured data
Data collection	Soil samples and swabs were taken from four different abattoirs in different towns in Osun State. The swabs were taken by scrubbing moistened swab sticks on the concrete slabs and tables in triplicates followed by the collection of 50 g of abattoir soil. Bacterial isolation was carried out using MacConkey, Mannitol salt, cetrimide and Colombia blood agar base media.
Data source location	Abattoirs in Ede, Ife, Iwo and Osu, Osun State, Nigeria.
Data accessibility	Repository name: Mendeley Data identification number: 10.17632/ccmrx8n7mk.1 Direct URL to data: https://data.mendeley.com/datasets/ccmrx8n7mk/1 Instructions for accessing these data: …
Related research article	*none*.

1. Value of the Data

- Machine learning researchers and microbiology professionals can derive significant value from these datasets.
- These datasets can be utilized for educational purposes to conduct user-centered analysis on the behavioral pattern of antibiotic resistance.
- The dataset is suitable for constructing classification models and can serve as a performance benchmark for the development of cutting-edge machine learning model.

The dataset gives qualitative environmental data of geographic location showing sampling sites

The dataset also shows the resistance phenotypes susceptibility, intermediate, and resistance to the antibiotics tested.

2. Background

Antimicrobial Resistance (AMR) is a global health crisis driven by the misuse and overuse of antibiotics in humans and animals. Its impact extends beyond human health, affecting food security, economic growth, and social equity [1]. Low- and middle-income countries are disproportionately burdened by AMR due to factors such as poverty, inadequate sanitation, and limited access to healthcare [2]. This complex issue necessitates an approach that recognizes that the health of people is closely connected to the health of animals and our shared environment.

To combat AMR, accurate and timely diagnosis of infections is crucial. However, there is a scarcity of data addressing the demographics and clinical characteristics associated with AMR against commonly used antibiotics in developing countries which has hinder effective treatment [3]. Thus, **u**nderstanding the factors influencing AMR patterns is essential for developing targeted interventions. This study leverages a retrospective analysis of microbiology records from Abattoirs in selected regions of western Nigeria to explore the association between demographics, clinical characteristics, and antimicrobial resistance. By identifying trends and patterns in AMR data, we aim to contribute to the development of data-driven strategies to combat this global threat.

3. Data Description

Our dataset comprises 274 bacterial isolates collected from four abattoirs located across Osun State: Ede, Ife, Iwo, and Osu. Within each abattoir, samples were obtained from three key points:

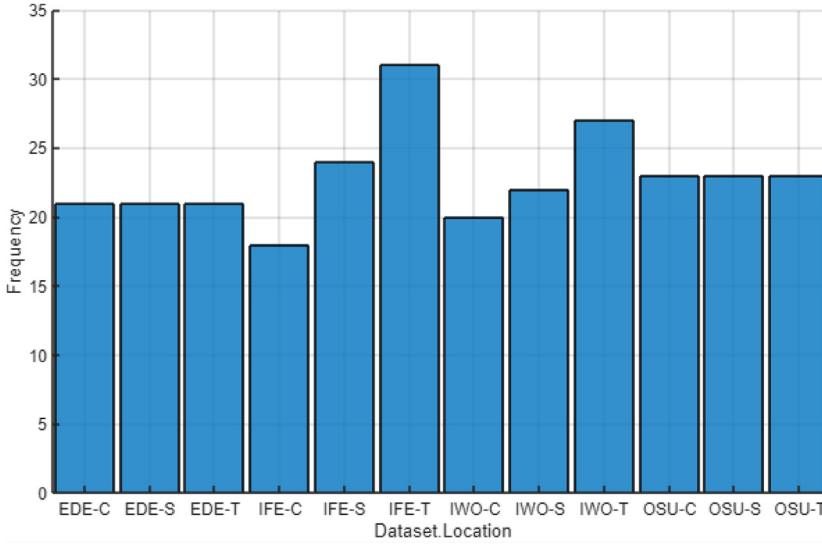

Fig. 1. Dataset distribution of antibiotic resistant bacteria isolated from abattoir samples in four towns within Osun state.

the butcher table (T) where beef dissection takes place, the concrete slab (C) used for slaughtering, and the soil (S) near the concrete slab. These sampling locations are reflected in the data labels, such as Ede-C, Ede-S, and Ede-T, which indicate the town (Ede), sampling point (C - concrete slab), and so on. Fig. 1 depicts the visual representation of the sampling scheme.

Two hundred and seventy-four (274) bacteria isolates were screened for Antibiotics susceptibility testing using five (5) different antibiotics belonging to different classes. If resistance to antibiotics in different classes is recorded, then the magnitude of resistance is wide and poses health risks from transfer of resistance to previously non-resistant bacteria. The antibiotics with their concentration in micrograms(µg) are Imipenem (10 µg), Ceftazidime(30 µg), Gentamycin (10 µg), Augmentin(µg) and Ciprofloxacin(5 µg). The antibiotics selected are the most prescribed in the sampling area. The zones of inhibition for both sensitivity and resistance were measured in millimeters and interpreted into Sensitive, Intermediate and Resistant [4].

Fig. 2 employs a bar chart to effectively illustrate the average resistance levels for various antibiotics across the four locations (Ede, Ife, Iwo, and Osu). This visual representation allows the study to display the susceptibility of bacteria to different antibiotics at a glance. While Fig. 2 provides an initial overview, Fig. 3 could offer a more granular view of the distribution of antibiotic resistance levels. This shows the percentage of isolates categorized as sensitive, intermediate, or resistant for each antibiotic within each location.

4. Experimental Design, Materials and Methods

All the three senatorial districts within Osun state, Nigeria were sampled. Two towns within each senatorial district were chosen, with one densely populated and the other having a less dense population. An abattoir was purposely selected within each town within the senatorial district. Soil samples and swabs were taken from each abattoir. The swabs were taken by scrubbing moistened swab sticks on the concrete slabs and tables in triplicates followed by the collection of 50 g of abattoir topsoil sample within 1 foot from the end of the concrete. Bacterial isolation was carried out using MacConkey, Mannitol salt, cetrimide and Colombia blood agar base media.

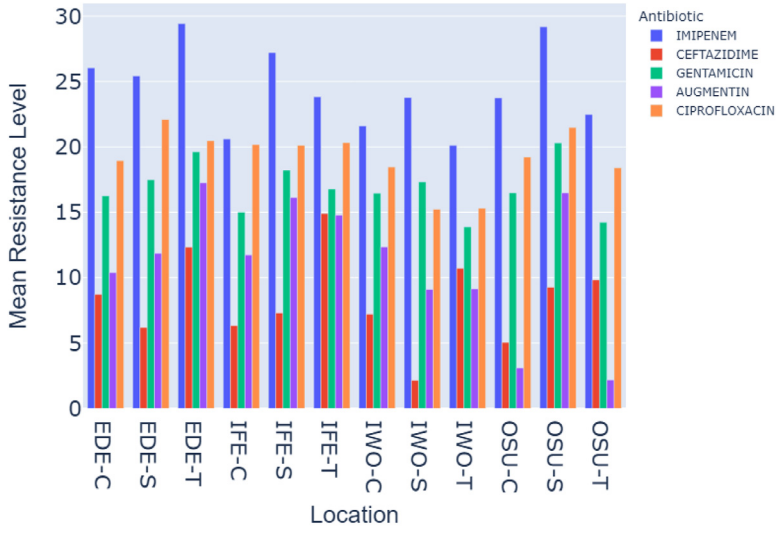

Fig. 2. Mean resistance levels by location.

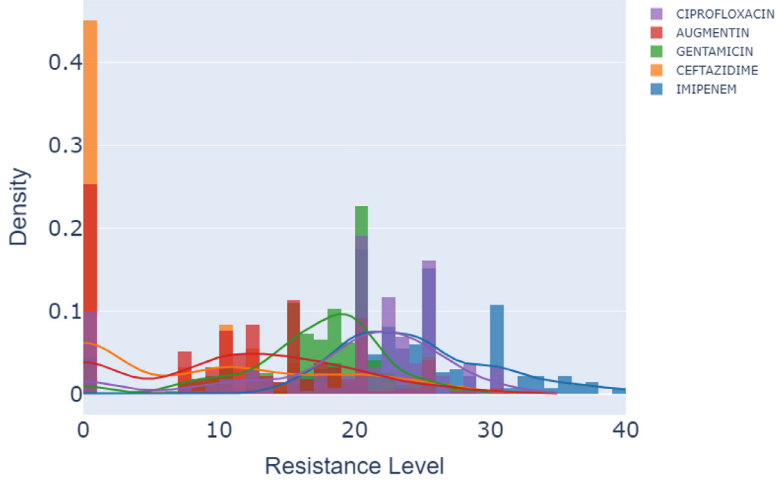

Fig. 3. Distribution of antibiotic resistance levels.

Five milliliters of peptone water was sterilized and aseptically introduced into each swab stick and incubated for 3 h. After that, one milliliter (1 mL) of the peptone water was inoculated into Petri plates using the different media and the plates were incubated at 37 °C for 24 h afterwards, distinct colonies were picked for purification and further tests.

The pure isolates were subjected to antibiotic susceptibility testing (AST) by standardizing to 0.5 MacFarland. The turbidity was reduced and adjusted by adding sterile water. The accuracy of the density of the McFarland standard was checked by measuring the absorbance using a spectrophotometer at a wavelength of 625 nm, to give absorbance of between 0.08 and 0.13 and the adjusted suspension count of 10^8 cfu/mL Inoculation was carried out by evenly spreading 1 ml of the isolates on sterile Mueller-Hinton agar in Petri plates. Discs impregnated with the five antibiotics Imipenem (10 µg), Ceftazidime(30 µg), Gentamycin (10 µg), Augmentin(µg) and Ciprofloxacin(5 µg). representing different classes were aseptically placed on the seeded plates,

left for 30 min for diffusion to take place, and the plates were incubated at 37 °C for 24 h. The zones of inhibition were measured in mm and values obtained were interpreted according to CLSI, 2020 [2] (Table 1).

Table 1
Bacterial identification at different study locations.

Location	*Enterococcus faecium*	*Staphylococcus aureus*	*Klebsiella pneumoniae*	Acinetobacter baumanni	*Pseudomonas aeruginosa*	*Enterobacter* sp
IFE T	2	6	7	6	6	1
IFE C	2	6	7	5	9	0
IFE S	2	5	7	4	4	1
OSU T	2	4	6	6	8	0
OSU C	2	7	10	3	8	0
OSU S	3	3	4	4	3	2
IWO T	4	7	8	3	8	2
IWO C	4	4	5	5	6	2
IWO S	4	1	7	5	7	0
EDE T	2	5	6	4	3	1
EDE C	1	5	6	2	5	1
EDE S	5	2	4	1	7	1

Limitations

Not applicable.

Ethics Statement

This research does not require ethical approval.

CRediT Author Statement

Bukola O. Atobatele, Odunola O. Olaniran and Abimbola A. Owoseni participated in data collection, collation, analysis and labelling from the identified abattoirs.

Bukola O. Atobatele and Segun Adebayo preprocessed the data, and took lead in writing the manuscript. Segun Adebayo and Abimbola Owoseni proof read the final manuscript.

All of the authors contributed to the article and gave their approval to the final version after offering constructive criticisms.

Data Availability

Antimicrobial Resistance Dataset (Original data) (Mendeley Data).

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Declaration of Competing Interest

The authors declare that they are free of any financial or personal conflicts that might have had an effect on the research reported in this study.

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