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Pathogenic *Escherichia coli* strains recovered from selected aquatic resources in the Eastern Cape, South Africa and its Significance to Public Health

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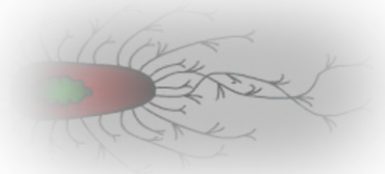
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Introduction

- Beach water is exposed to risk of fecal contamination particularly when it serves as a regular receiving watershed for WWT facilities (Holveck et al., 2007).
- The discharge of considerable quantities of poorly treated wastewater final effluents into receiving water has led to pollution of the aquatic environments (Kahariri, 2014) and this can be a source of life-threatening gastrointestinal diseases, stomach infections, flu, respiratory infection, ears and skin infections (Boehm et al., 2009).
- There have been reports of closure of the Nahoon beach in April 2013 and September 2015 and poses health risk to beach goers, swimmers and the society at large, and a motivation for this current study.

Objectives



1. To isolate and identify the presumptive *E. coli* recovered from the beach water samples.
2. To determine the virulence genes of the confirmed isolates.
3. To determine the antimicrobial resistance patterns of the confirmed *E. coli* pathotypes.

Methodology

Sample collection

- Water samples were collected bi-weekly from 6 different sampling points along the Nahoon beach and canal for a period of 12 months.

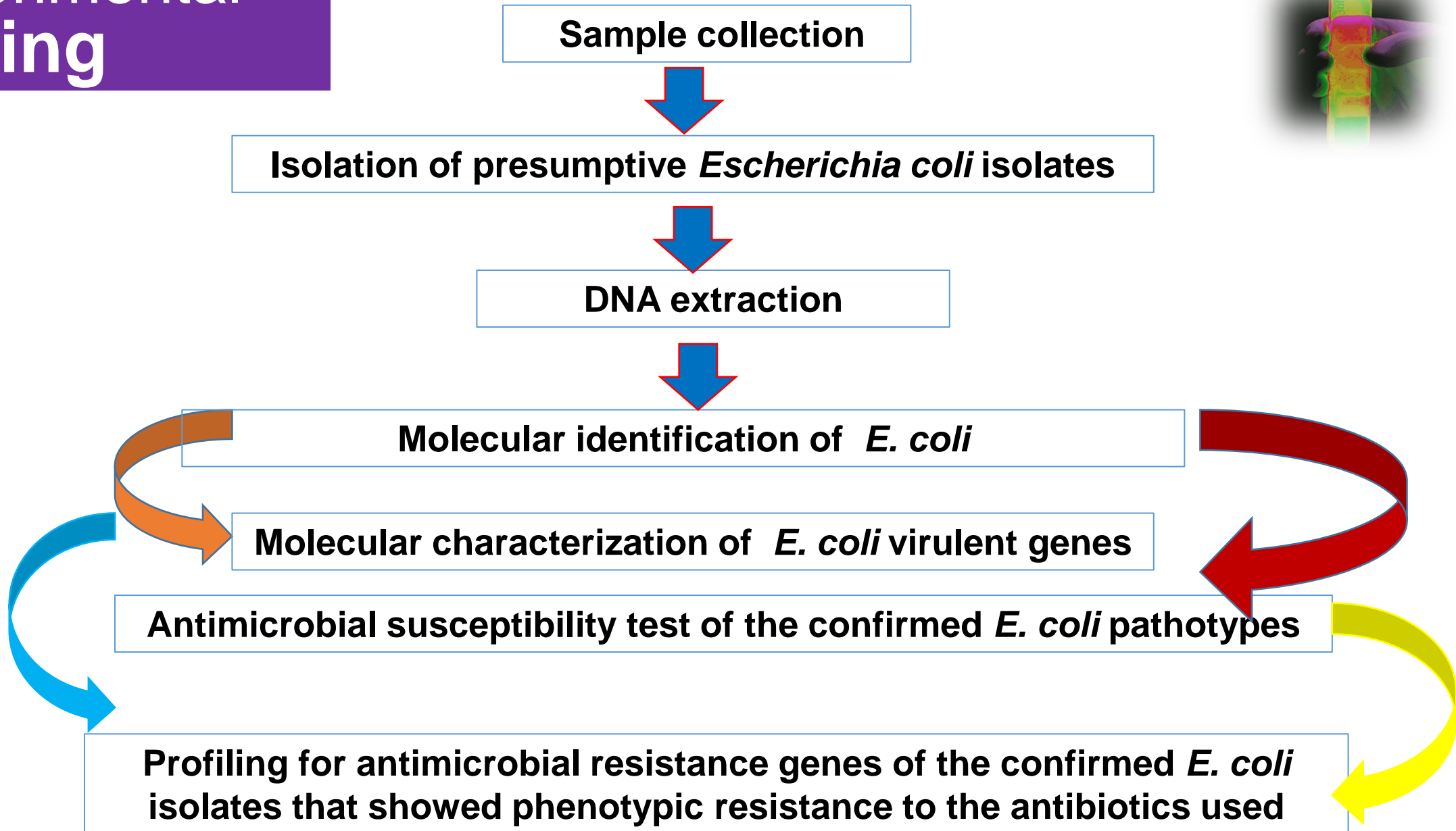
Isolation of presumptive isolates

- Samples were filtered using the membrane filtration technique and *E. coli* chromogenic agar (incubation at 37 °C for 18–24 h). After incubation, the isolates were re-streaked onto nutrient agar (NA) plates (incubation at 37 °C for 24 h). Presumptive *E. coli* isolate colonies were picked from the NA plates, inoculated into nutrient broth, and incubated at 37 °C for 24 h. Thereafter, DNA was extracted by boiling method (Torres et al. 2003).

Molecular confirmation and antibiotic susceptibility test

- Molecular identification of the confirmed *E. coli* isolates targeting the *uidA* gene and the various genes of the *E. coli* pathotypes screened as well as antimicrobial susceptibility test were determined following the methods described by Titilawo et al. (2015).

Experimental Setting

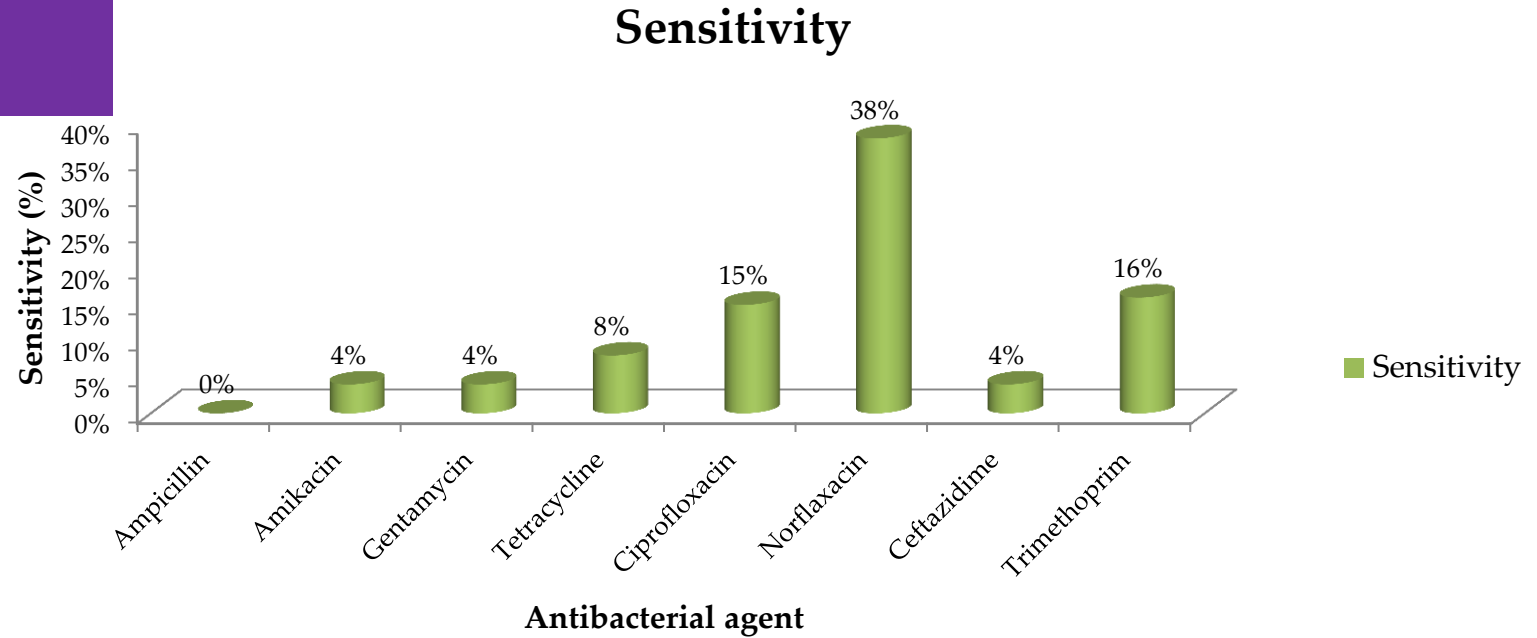


Results and Discussion

- Out of 260 presumptive isolates, 107 (41.2%) were positive.
- Out of 107 positive *E. coli* isolates, 73 (68.2%) were found to be pathotypes.
- **EIEC** (14, 13.1%); **NMEC** (48, 44.9%) and **EPEC** (11, 10.3%).
- Out of 73 pathotypes of *E. coli* isolates, 22 (30.1%) showed multiple-resistance to all antimicrobial agents.

Results and Discussion

Figure 1: Sensitivity percentages of *E. coli* isolates to 8 antibacterial agents.



- It was observed that bacterial counts from the sampling points where wastewater is being discharged into the beach had the highest number of positive isolates during the spring season and festive period and our findings support the report of de Carvalho and Neto (2016).
- From our study, the MARI value (0.05) obtained for the isolates was less than 0.2, signifying that the isolates originated from environments with minimal antimicrobial use.

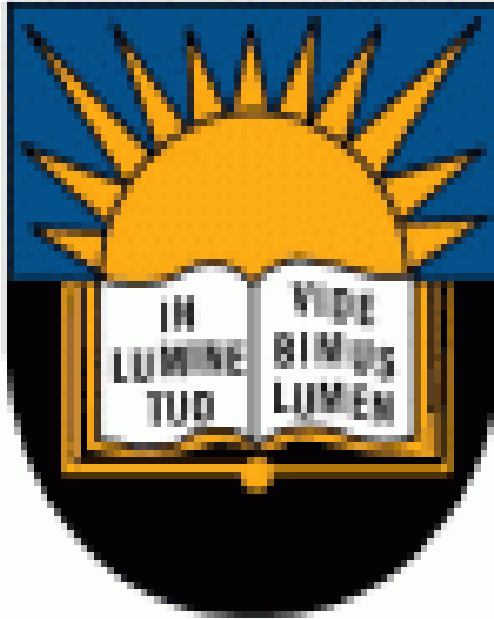
Conclusions & Recommendations

- This research work demonstrates that the aquatic environs of Nahoon beach are potential reservoirs of pathogenic *E. coli* strains that might probably combine a high level of antimicrobial resistance indicating the pressure mount by antimicrobials usage, and therewith posing a public health risk to humans upon exposure.
- Hence, we recommend that there should be regular monitoring of the water quality of recreational beaches particularly those that serve as receiving watersheds.

References

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Acknowledgements



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Thankyou.



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