

ISOLATION, CHARACTERIZATION AND ANTIBIOTIC SUSCEPTIBILITY PROFILES OF BACTERIA AND FUNGI FROM SELECTED AUTOMATED TELLER MACHINE (ATM) KEYPADS AT KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY (KNUST), KUMASI

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INTRODUCTION

With increasing digitalization, Automated Teller Machines (ATMs) have become common public touch surfaces, facilitating millions of transactions daily (Abban & Tano-Debrah, 2011). Their frequent use facilitates microbial contamination and transfer. Studies have identified bacteria and fungi such as *Staphylococcus* spp., *Escherichia coli*, *Pseudomonas* spp., and *Aspergillus* spp., some showing multidrug resistance (Acharjee et al., 2019). Understanding the composition, resistance patterns, and contamination levels of these microbes on ATM keypads is crucial to improve knowledge of microbial survival and related public health risks.

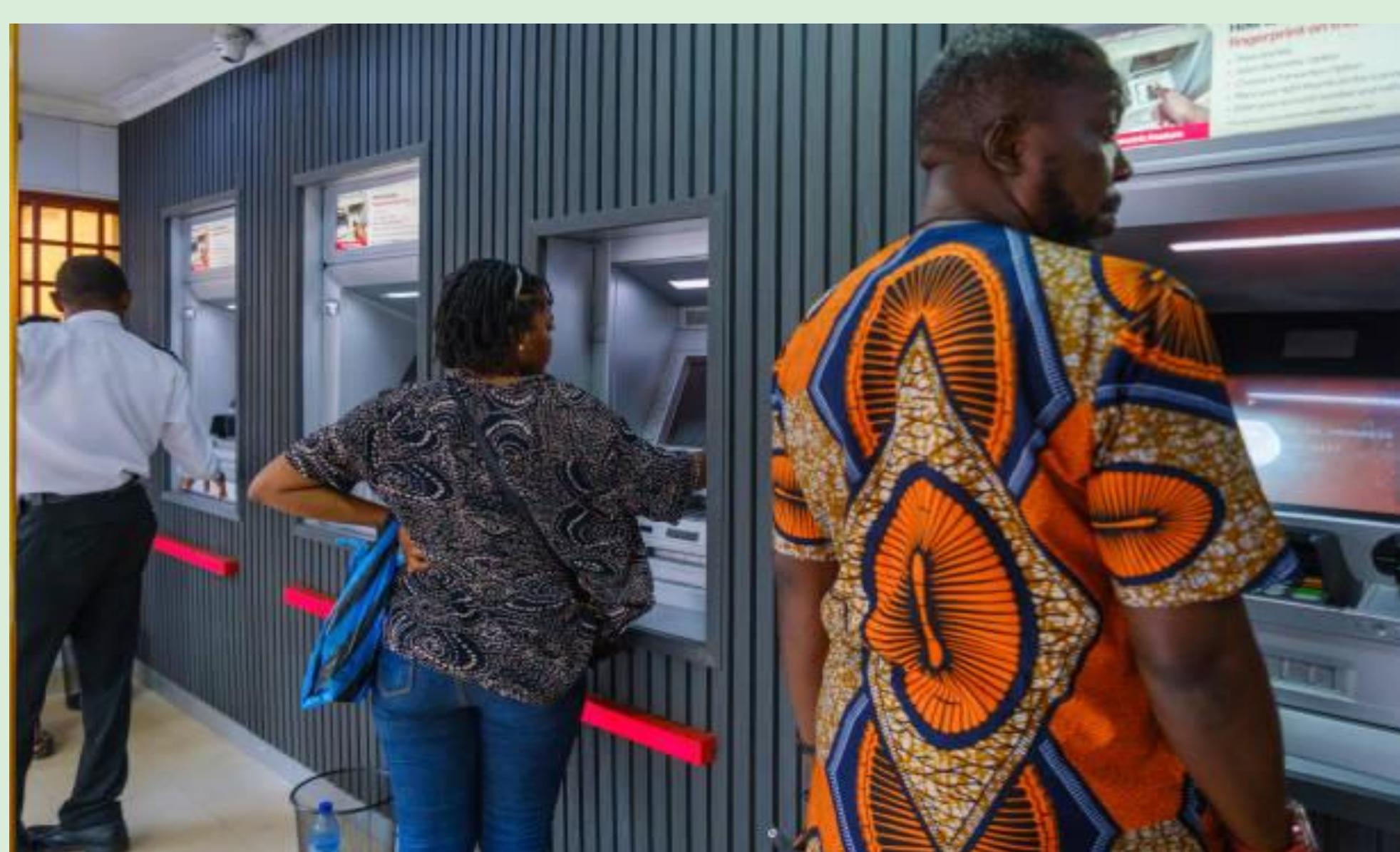


Plate 1: People using ATMs

OBJECTIVES

Main Aim

- ✓ To determine the bacterial and fungal diversity on ATM keypads and evaluate their antibiotic resistance patterns.

Specific Objectives

- ✓ To isolate, identify, and characterize the bacterial and fungal species present on ATM keypads.
- ✓ To determine the antibiotic resistance patterns of bacterial isolates from ATM keypads.

METHODS

- ✓ A cross-sectional study with 7 selected ATMs.
- ✓ Sampling by swabbing ATM keypads.



Plate 2: Sample Collection; swabbing

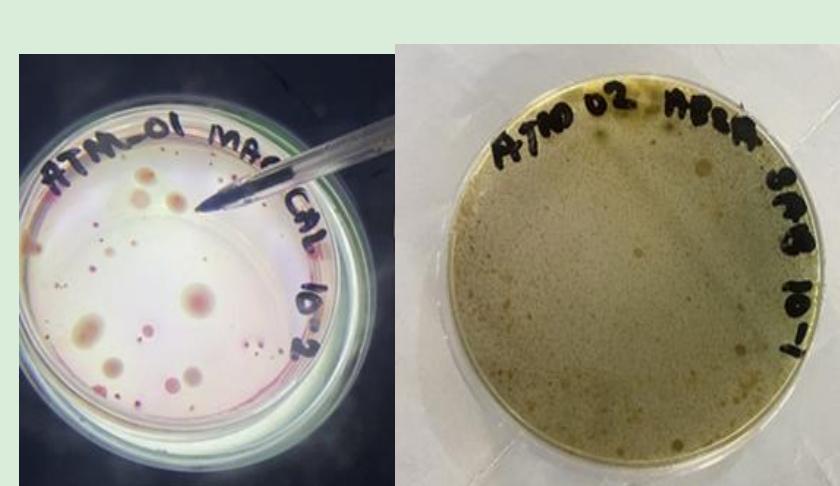


Plate 3: Microbial Cultures

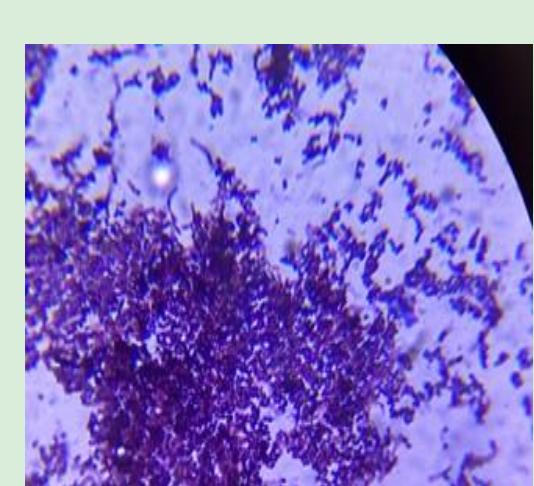


Plate 4: Microscopic view of gram-positive bacteria

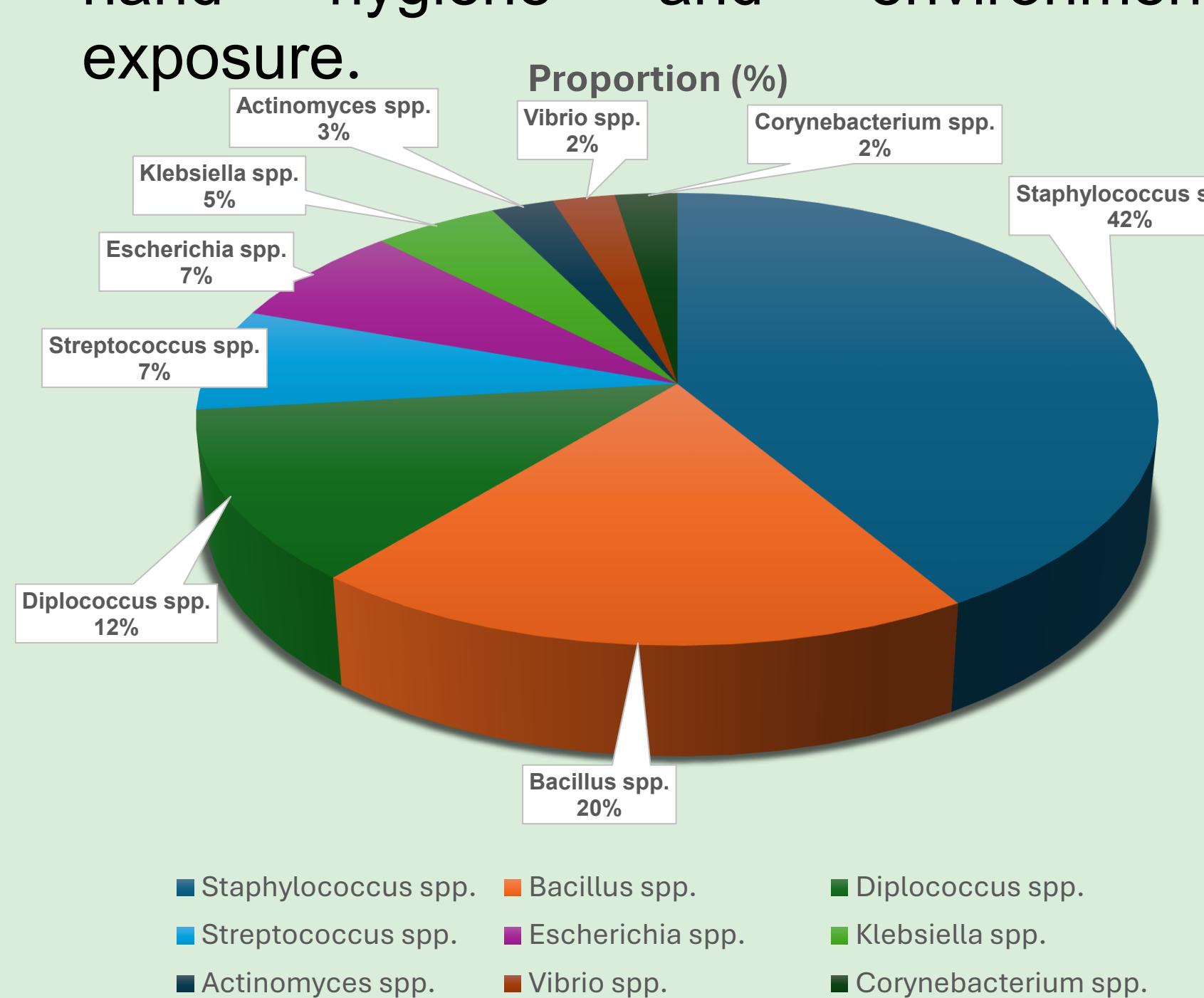


Figure 3: Proportion of Bacterial Species Across all ATMs



Plate : Indole Test



Plate 6: Confirmation of *E. coli*

RESULTS AND DISCUSSION

- ✓ ATMs located at Commercial area have higher bacterial loads than Parade ground ATMs ($p > 0.05$).

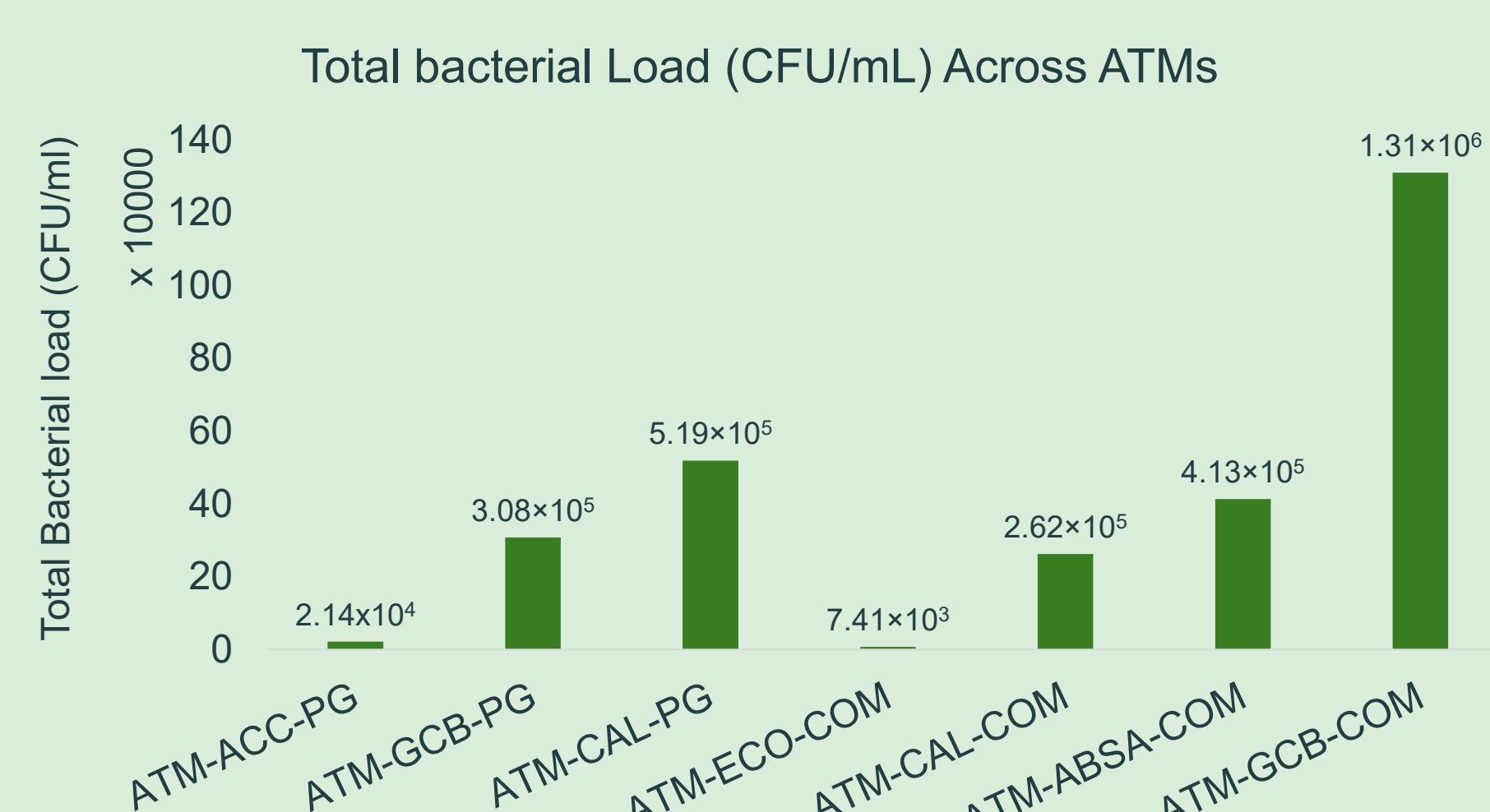


Figure 1: Total Bacterial Load (CFU/mL) Across ATMs.

- ✓ Fungal contaminations are greater on ATMs in Commercial area compared to Parade grounds ($p > 0.05$).

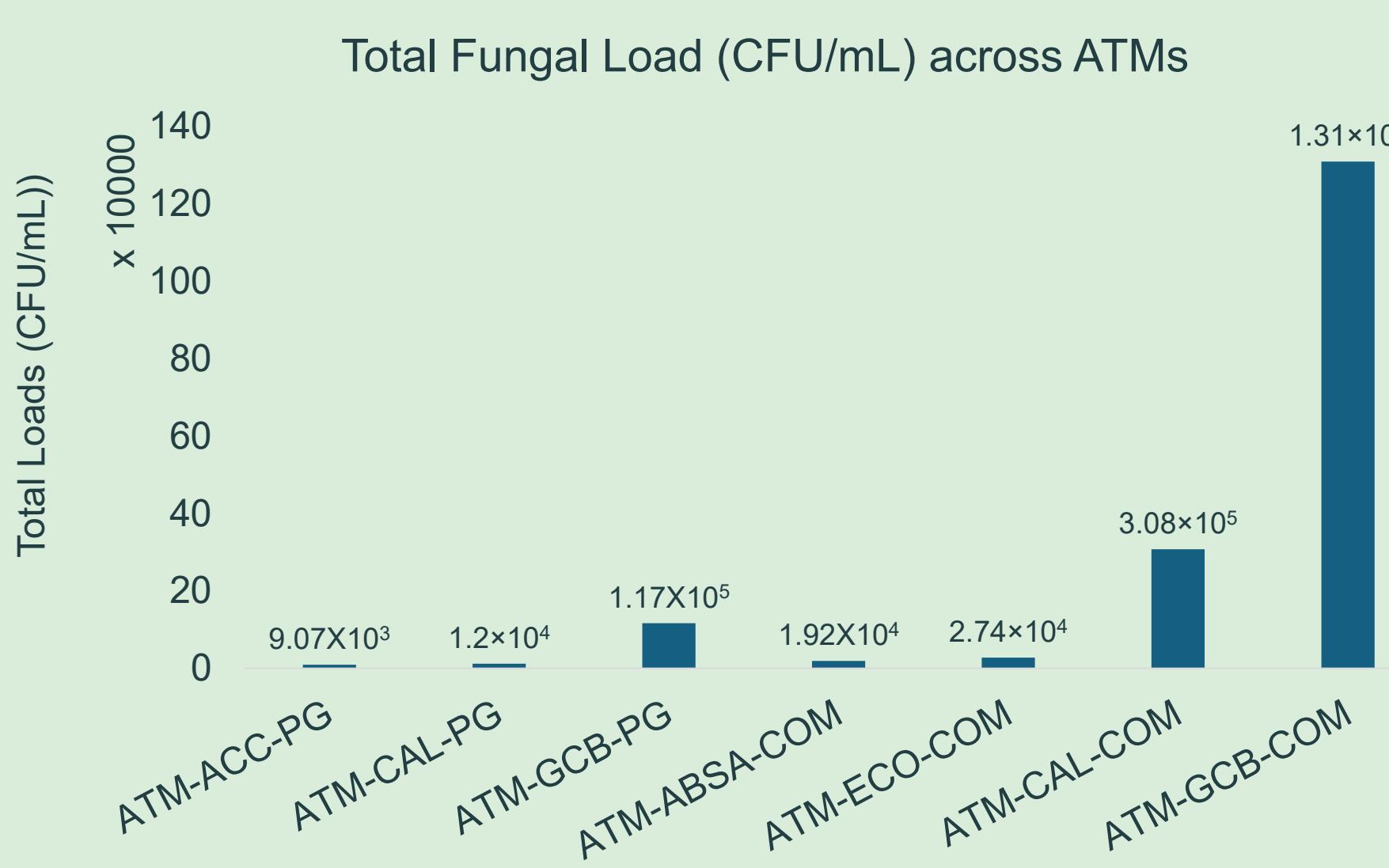


Figure 2: Total Fungal Load (CFU/mL) Across ATMs.

- ✓ *Staphylococcus* (42%) was the most dominant isolate, followed by *Bacillus* (20%) and *Klebsiella* (12%). The detection of faecal indicator bacteria (*Escherichia*, *Klebsiella*) and water-associated organisms (*Vibrio*) suggests contamination possibly linked to poor hand hygiene and environmental exposure.

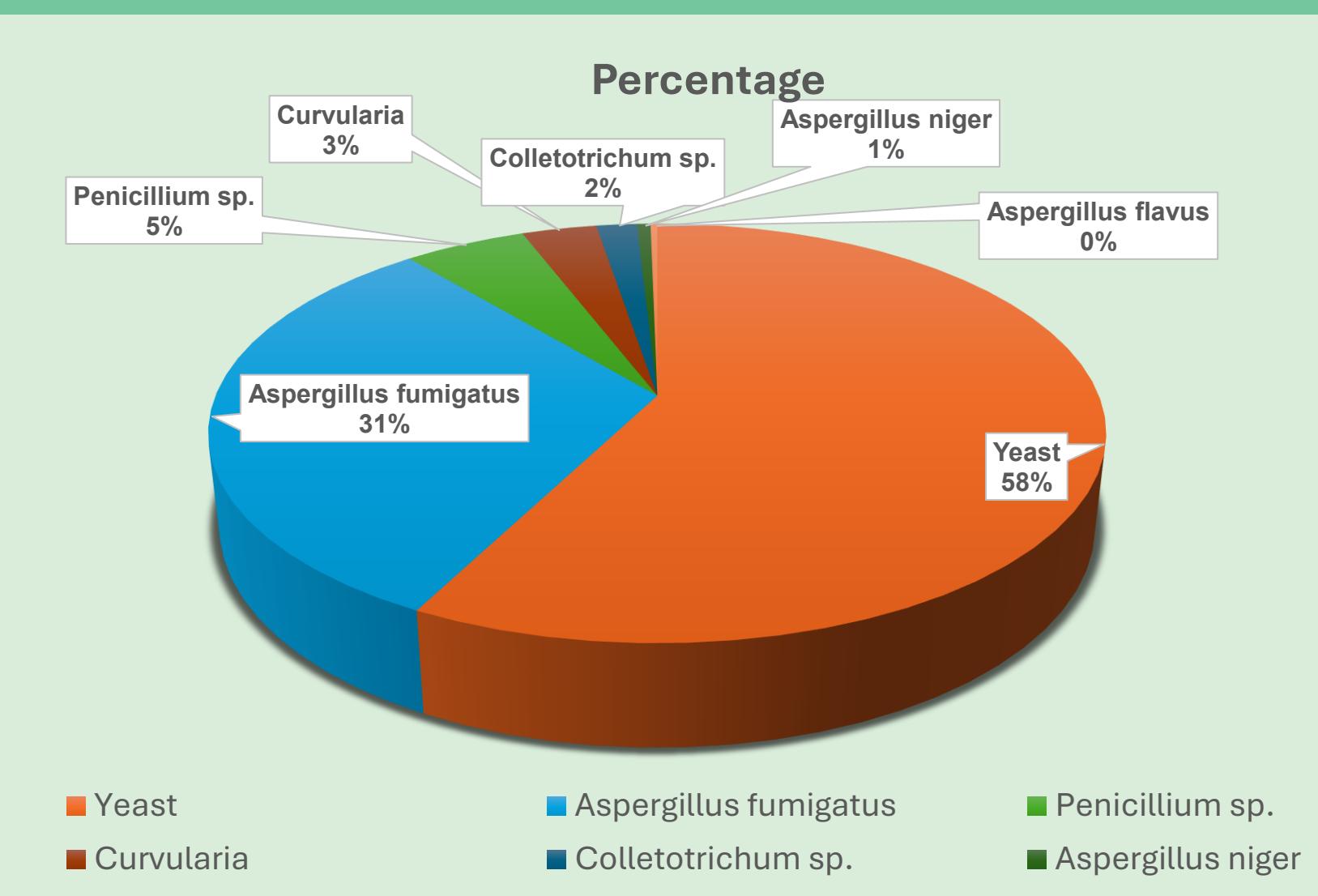
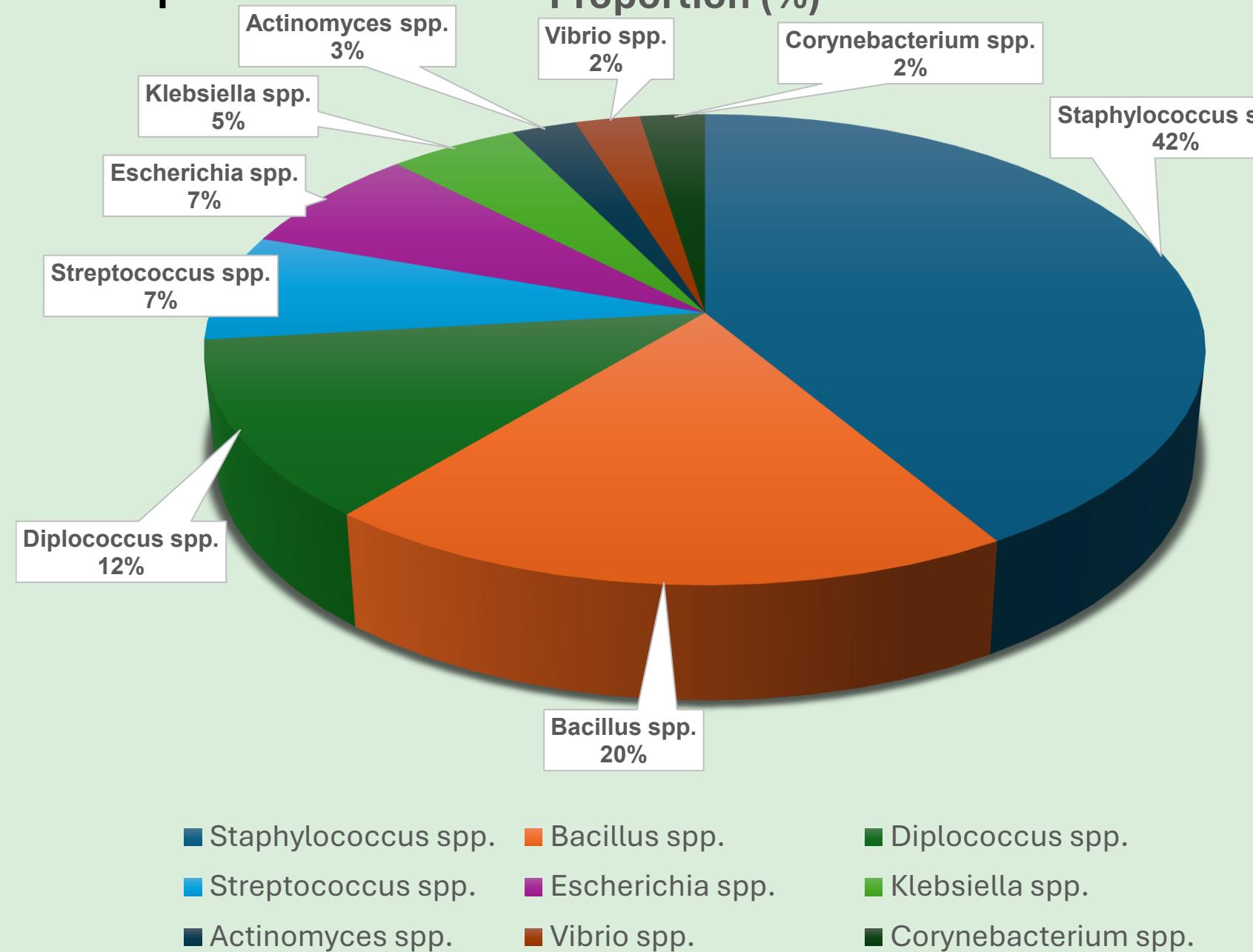


Figure 4: Proportion of Fungal Species Across all ATMs

- ✓ Gram-positive bacteria show high resistance to co-trimoxazole and cephalaxin, with variable resistance to other antibiotics.
- ✓ Gram-negative bacteria exhibit high resistance to most β -lactams and co-trimoxazole, with lower resistance to aminoglycosides and fluoroquinolones.

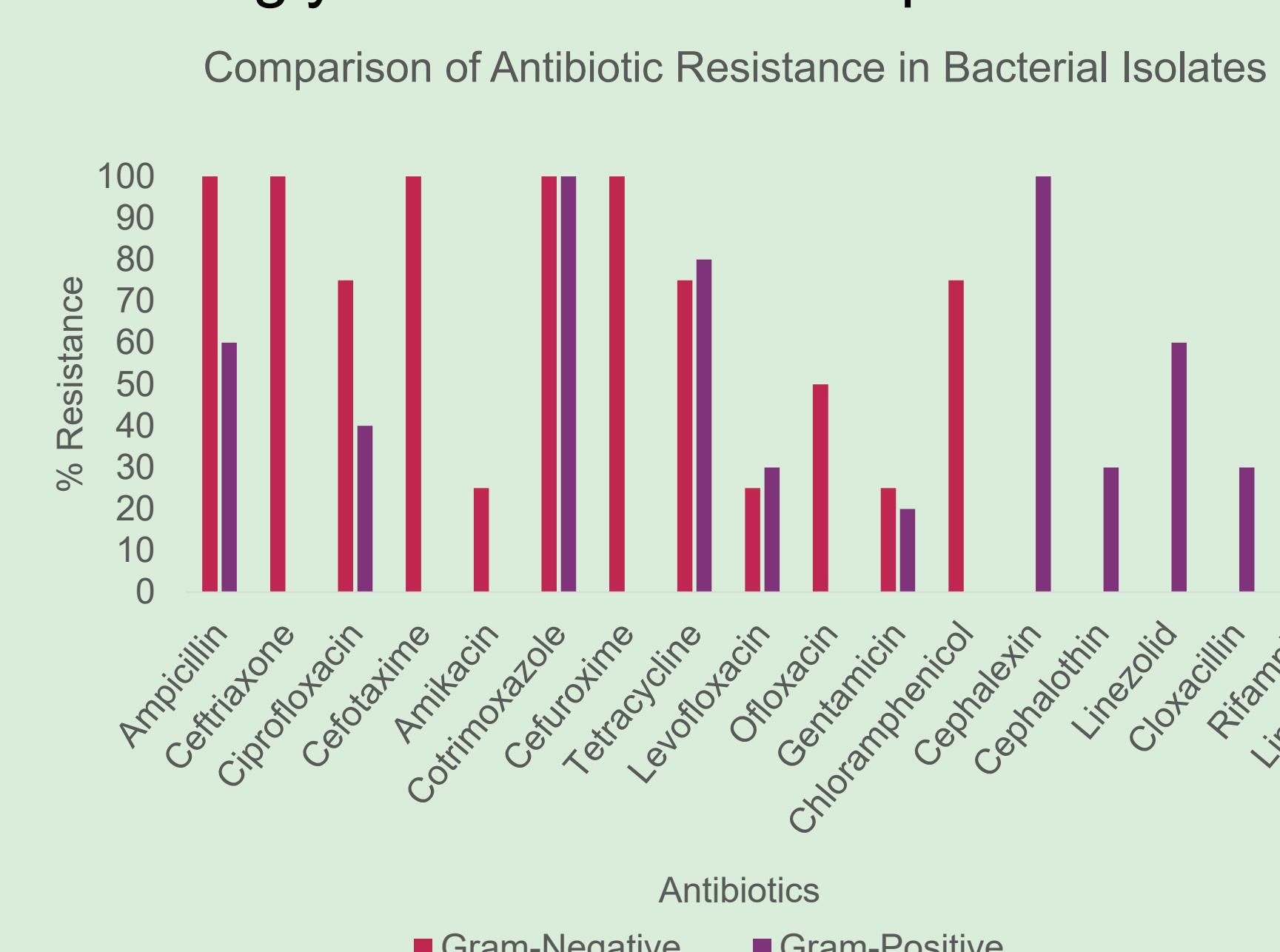


Figure 5: Comparison of Antibiotic Resistance in Gram-Negative and Gram-Positive Bacterial Isolates

CONCLUSION AND RECOMMENDATION

- ✓ ATM keypads at KNUST harbour diverse bacterial and fungal species, including multidrug-resistant strains such as *Staphylococcus aureus* and *Escherichia coli* highlighting the potential role of public touch surfaces in microbial transmission.
- ✓ Regular disinfection, improved hand hygiene, and further monitoring are needed, with future studies expanding sampling, testing, and assessing microbe transfer between surfaces and users.

ACKNOWLEDGEMENT

- ✓ We thank the Managers of GCB Bank, Calbank, Ecobank, ABSA bank and Access bank for allowing us to take samples from their ATMs.

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- ✓ Abban, S., & Tano-Debrah, K. (2011). Automatic teller machines (ATMs) as potential sources of food-borne pathogens – a case from Ghana. *Nature and Science*, 2011;9(9).
- ✓ Acharjee, M., Akter, T., Tabassum, N., Rahaman, M. M., & Noor, R. (2019). Prevalence of Methicillin and Vancomycin resistant *Staphylococcus aureus* on the touch screen of automated teller machines in Dhaka city. *Bangladesh Journal of Microbiology*, 36(1), 23–27.