# Exploring the Relationship Between Land Cover and Malaria Prevalence in Ghana: A Regression Analysis

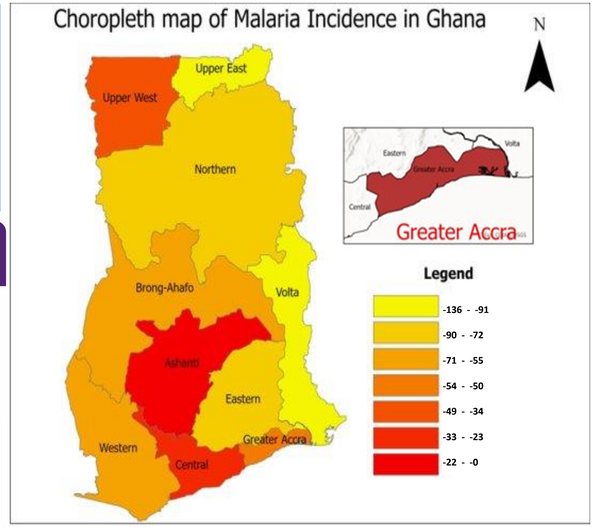
**Emmanuel N. Aklie, Prabish Khadka Chhetri, Mark Sciuchetti, Saeideh Gharehchahi**
**Department of Chemistry and Geosciences, Jacksonville State University, Jacksonville, AL, USA**

## INTRODUCTION

Malaria is a major public health concern in Africa, particularly in Ghana, with an estimated 10 million cases and 20,000 death reported annually. This study aims to examine the association between land cover and malaria prevalence in Ghana. The use of remote sensing data such as Landsat 8 imagery from USGS provides an opportunity to investigate this relation in more detail and is important for planning and decision making.

## STUDY AREA

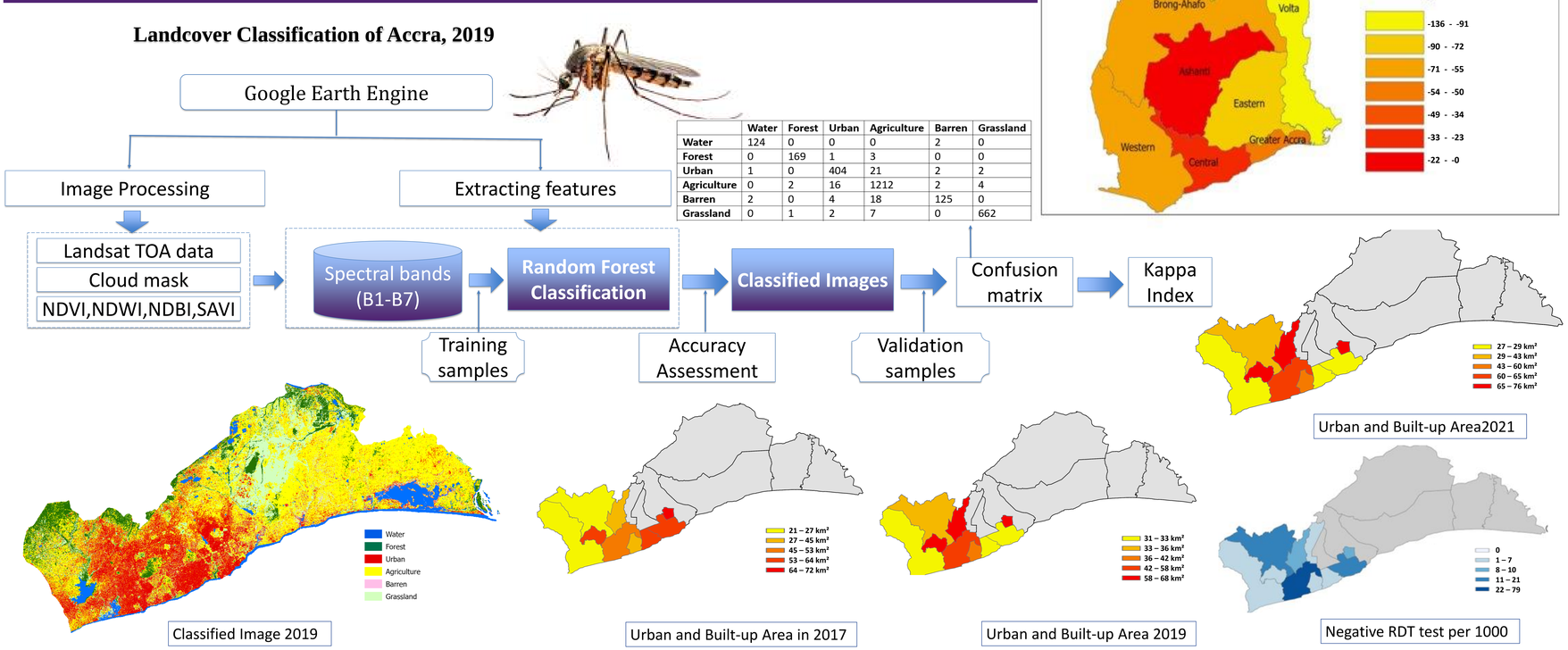
Study area map of the Greater Accra, the Capital city of Ghana, located along the coast of the Atlantic ocean. According to the Malaria Atlas project, the rate of Malaria incidence is medium in Ghana.
Greater Accra has the highest population and is the smallest in terms of Area.




## METHODOLOGY

A linear regression analysis was conducted using DHS data as the dependent variable (specifically, the proportion of individuals who tested negative for malaria using the HML32 RDT test) and the six land cover categories as independent variables. The HML32 RDT test was chosen as the dependent variable because it provides information about the proportion of individuals who are not infected with malaria, allowing investigation of factors associated with a lower risk of malaria.

## DATA

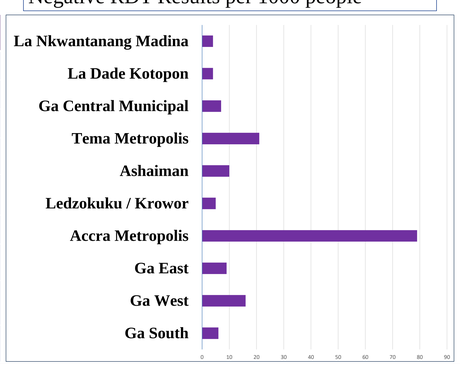



| | Water | Forest | Urban | Agriculture | Barren | Grassland |
|---|---|---|---|---|---|---|
| **Water** | 124 | 0 | 0 | 0 | 2 | 0 |
| **Forest** | 0 | 169 | 1 | 3 | 0 | 0 |
| **Urban** | 1 | 0 | 404 | 21 | 2 | 2 |
| **Agriculture** | 0 | 2 | 16 | 1212 | 2 | 4 |
| **Barren** | 2 | 0 | 4 | 18 | 125 | 0 |
| **Grassland** | 0 | 1 | 2 | 7 | 0 | 662 |

Land-use classes of 2019

| District | Water | Forest | Urban | Agriculture | Barren | Grassland |
|---|---|---|---|---|---|---|
| Ga South | 35.15 | 59.64 | 85.47 | 155.71 | 6.93 | 44.21 |
| Ga West | 0.18 | 93.26 | 91.92 | 94.19 | 4.43 | 25.54 |
| Ga East | 0.01 | 7.17 | 47.41 | 26.02 | 1.44 | 4.73 |
| Accra Metropolis | 3.70 | 12.20 | 86.11 | 27.59 | 1.04 | 11.99 |
| Ledzokuku / Krowor | 3.59 | 0.48 | 38.38 | 5.22 | 0.52 | 2.14 |
| Ashaiman | 0.02 | 0.115 | 13.54 | 3.18 | 0.08 | 1.38 |
| Tema Metropolis | 4.24 | 2.96 | 60.18 | 16.13 | 1.29 | 7.07 |
| Ga Central Municipal | 0.025 | 1.116 | 29.62 | 10.96 | 0.61 | 2.67 |
| La Dade Kotopon | 1.71 | 1.55 | 16.16 | 12.52 | 0.50 | 4.74 |

Negative RDT Results per 1000 people




## RESULTS AND FINDINGS

The linear regression model shows that the number of people tested negative (HML 32RDT) variable is not significantly related to Water, Forest, Agriculture, Barren or Grassland, as indicated by their p-values greater than 0.05. However, Urban has a positive coefficient with a p-value of 0.0665, which indicates a weak positive relationship with Negative RDT result. The model explains 94% of the variation in the data, as indicated by the multiple R-squared value, and suggests that Urban may have a slight influence on Negative RDT tests. However, further analysis and data are required to confirm this relationship.
The findings suggest that urbanization may lead to a reduction in malaria prevalence in Ghana, possibly due to improved healthcare access and living conditions in urban areas.

## CONCLUSION

The study provides insights into the complex relationship between land cover and malaria prevalence in Ghana. Future research can explore the role of urbanization in reducing malaria prevalence in other areas of Ghana and beyond.
We will expand the analysis to cover a wider range of districts in Ghana and investigate other potential factors affecting malaria prevalence, such as climate, use of nets, access to care, and socioeconomic factors.

## LIMITATIONS

- ✓ Limited availability of clear satellite images due to cloud cover in coastal areas of Ghana is a major limitation for this project.
- ✓ Access to relevant data to the project is a major limitation that has affected the scope and accuracy of the analysis.
- ✓ The data obtained contain errors, inconsistencies or missing values, which require extensive manual cleaning.

## REFERENCES

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- ✓ Afrifa, J., Boamah, D., & Appiah, S. (2020). Spatial analysis of malaria prevalence in Ghana. BMC Public Health, 20(1), 1-11. https://doi.org/10.1186/s12889-020-08616-4