IRGF Final Report
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Project Title: Leveraging ML to Transform Febrile Disease Diagnosis in Resource-Limited and Vulnerable African Countries

1.1 Project Summary

This research seeks to leverage artificial intelligence (AI) to improve healthcare access for vulnerable populations, particularly children, women, and the elderly in low-income communities across Africa where healthcare services are often scarce. Additionally, the research incorporates a complex process of mining and refining the experiential knowledge of physicians, an essential component of knowledge engineering. This process is critical for the development of an effective medical decision support system, as it combines machine learning with expert insights to improve diagnostic accuracy and healthcare outcomes.

1.2 Student involvement

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1.3 Dissemination and Knowledge Mobilization

- Leveraging non-clinical factors and machine learning for improved tuberculosis prediction in resource-limited areas
- Predicting enteric fever severity using non-clinical data: a machine learning approach for low-resource settings
- Bridging the health insurance gap in akwa ibom: a data-driven tableau assessment of healthcare financing among informal sector households
- Machine learning for febrile typhoid risk stratification using integrated bio-environmental and socioeconomic data.

1.4 Project Outcomes and Impacts

This project successfully leveraged data science to address critical public health challenges in resource-limited settings, generating significant outcomes across research, training, and community engagement. The core achievement was the development of predictive machine learning models that utilize non-clinical data to improve disease prediction for tuberculosis, enteric fever, and febrile typhoid. By demonstrating that socioeconomic and bio-environmental factors can effectively stratify patient risk and predict disease severity, this work provides a vital, low-cost screening tool for regions lacking advanced diagnostic infrastructure. These findings, disseminated in four peer-reviewed papers, have materially advanced the body of research on

AI-driven diagnostics for neglected tropical diseases. A key impact was the mentorship and training of the next generation of researchers; three students were supported to present this work at international conferences, significantly building local data science capacity. I personally presented our findings at one of these conferences, where engaging with peers and experts from diverse institutions allowed me to build valuable new contacts. These connections have already sparked collaborative discussions that will help further my research goals and open avenues for cross-institutional partnerships. Furthermore, a targeted data-driven assessment of health insurance gaps in Akwa Ibom State was conducted using Tableau, providing actionable insights to inform policy discussions on healthcare financing for informal sector households. This project has fostered new collaborative partnerships between academic, public health, and local community stakeholders, creating a sustainable network for future research. Overall, the outcomes provide a robust evidence base for integrating predictive analytics into public health planning, directly supporting the goal of more equitable and efficient healthcare delivery.