

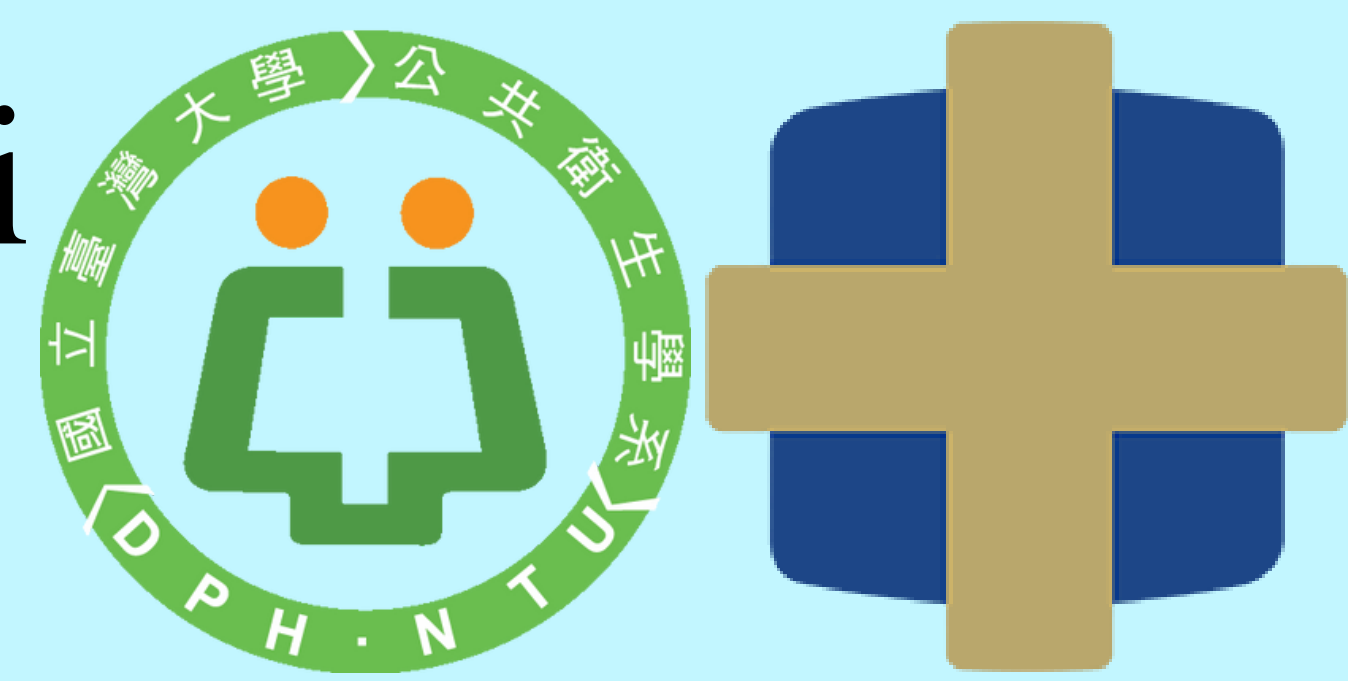
資料、系統與社會：馬拉威的公共衛生

Data, Systems, and Society: Public Health in Malawi

實習單位：Luke International Norway in Malawi

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Abstract

This summer, I conducted a public health internship at Mzuzu City and the surrounding areas of Malawi. My learning was integrated with Data Analysis, Health System Clerkship, and Society Observation from the front-line Global Health Development arena. I am inspired and appreciate that the complexity of global public health development shall be a combination of technical skills and social perspectives.

Background

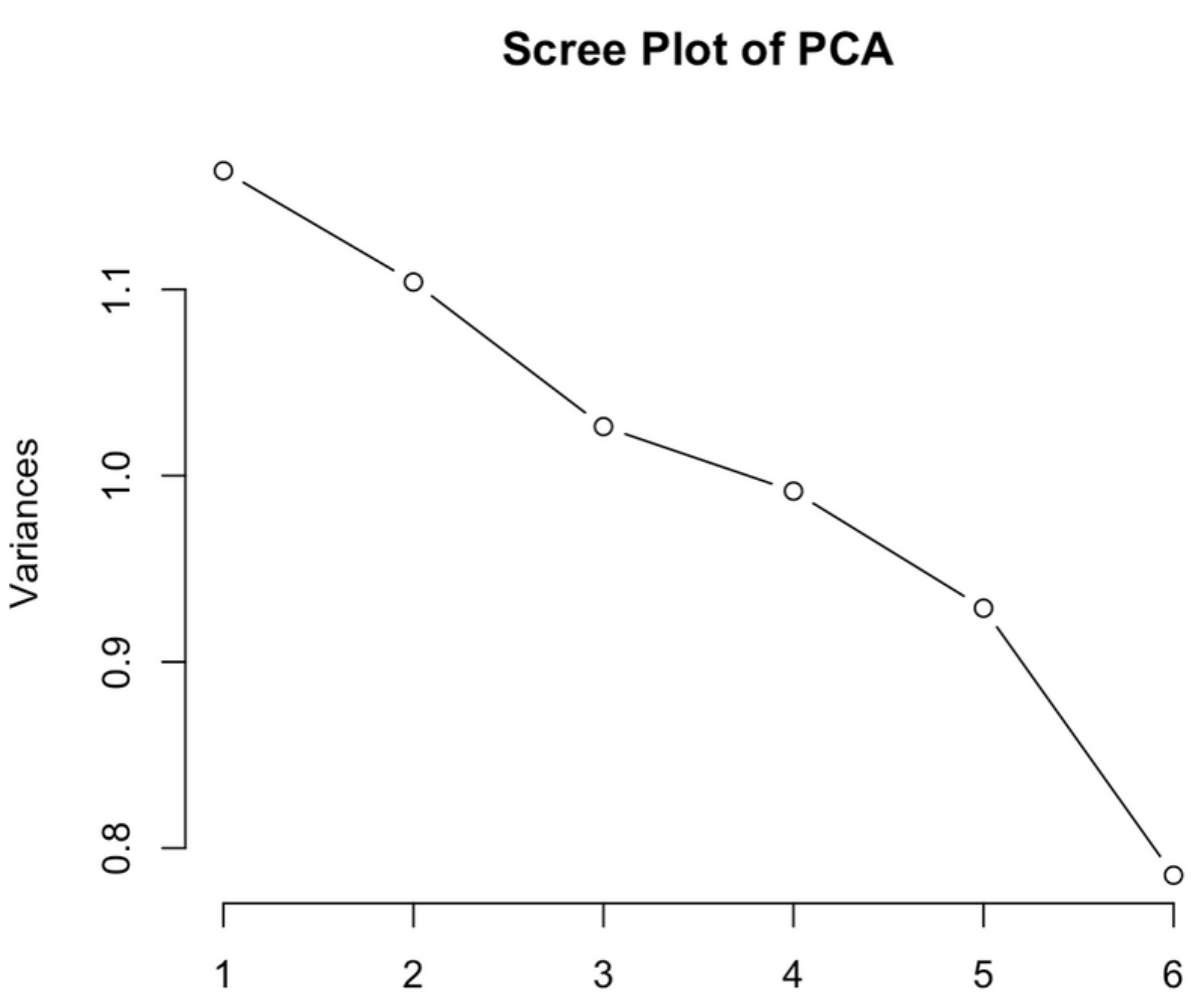
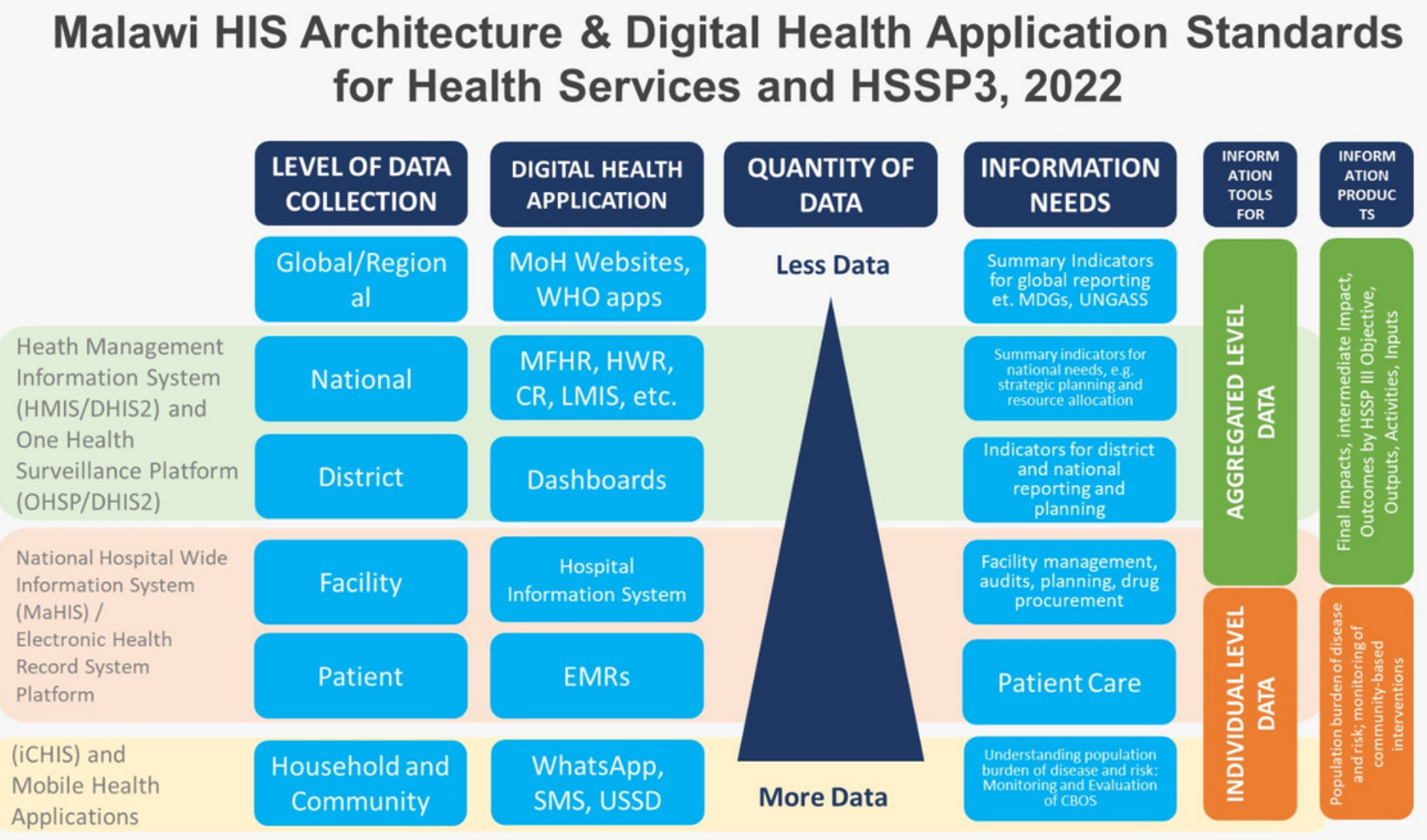
I am involved in (1) Pandemic Preparedness Toolkit (PPT) project funded by Wellcome Trust through the UK Office for National Statistics, which aims to develop training and analytical tools for global use in pandemic preparedness. (2) Health Information System strengthening program of LIN, which is a long-term program focusing on digital health development in Malawi, and (3) Community Development Projects of LIN, which support learning resources and foster healthier environments for children, families and the community at large.

Objectives

1. To analyse PPT’s Public Acceptance to assess the public’s acceptance of Digital Health Surveillance Tools Study data in identifying potential factors.
2. To support and contribute to the PPT Unit Content development.
3. To understand health information system strengthening programs' field implementation in hospital settings in Malawi.
4. To observe how community development projects are executed in Malawi.

Data Analysis and PPT Unit Content Development

I was assigned to analyse the study data with an applicable statistical tool in identifying potential factors associated with public acceptance of the digital health surveillance tool. The survey dataset was first cleaned by checking for inconsistencies, handling missing values through imputation, and preparing variables for analysis. Using R, I then performed Principal Component Analysis (PCA) to reduce dimensionality by transforming correlated variables into a smaller set of uncorrelated principal components while retaining most of the variance. The analysis revealed two dominant components: PC1, contrasting motivations rooted in trust, system ease of use, and community value with those driven by external incentives or tangible results; and PC2, differentiating motivations based on practical outcomes and convenience from those requiring advice or incentives to engage. These components summarise the main motivational factors for researchers to gain insights into how to increase public acceptance of the digital health surveillance system.



Syndromic Surveillance Unit Content Contribution

The enhanced revision of the Epidemic and Pandemic Syndromic Monitoring System unit of the PPT project was developed during my internship and aligned with guidance from the UK Office for National Statistics (ONS). I contributed to introducing various concepts and draft content to the unit: a hybrid detection framework that combines statistical rigour with artificial intelligence, ARIMA models capture temporal trends and seasonality, and cumulative sum control chart(CUSUM) monitor residuals to signal sustained upward shifts. Additionally, draft content on how Artificial Intelligence methods are applied to detect emerging health threats from unstructured text, identifying subtle and localised anomalies that classical models may miss, was added.

Health Information System – Mzuzu Central Hospital Story

In the Health System component, I visited Mzuzu Central Hospital to appreciate how the Health Information Systems (HIS) support HIV care and public health use. The hospital’s HIS integrates electronic medical records with a district reporting system (e.g. DHIS2) to track Anti-Retroviral Therapy (ART) patients from outpatient and inpatient departments. Assigned by LIN’s HIS department, I collected field data on patients with Advanced HIV Disease (AHD) and observed how the hospital implements the ART Electronic Medical Record System. The system collects data from doctors and transforms the digital records into visual graphs and useful information. During the visit, I noted a high prevalence of undiagnosed AHD among inpatients (about 53% of those screened, according to Q2 2025 records), underscoring the need for routine hospital-based screening and prompt treatment protocols. These findings indicate that leveraging the HIS can enhance case identification and improve patient management in HIV care.

Society Observation - Community Development Projects

Observing the Malawi society through LIN’s community projects, I visited rural schools to understand how educational and infrastructural conditions influence public health in rural communities. I observed schools without access to clean water, where students sometimes had to travel more than ten kilometres to fetch it, creating risks of waterborne diseases. Addressing safe water and sanitation requires substantial financial and infrastructural investment beyond the scope of my placement. Nevertheless, I contributed by participating in book and desk donations in rural schools, which helped improve the learning environment and indirectly supported students’ health and attendance.



Conclusions

This internship gave me the opportunity to work across Data, Systems, and Society. I applied PCA to the study data and improved PPT’s Syndromic Surveillance unit content with ARIMA, CUSUM, and AI-based anomaly detection methods. I studied health information systems for HIV and AHD care in Mzuzu Central Hospital. Through community engagement and school visits, I also learned how education and infrastructure influence public health at the community level. From this experience, I came to appreciate that public health is not only about data and systems but also about working together across disciplines, respecting local contexts, and ensuring fairness in access to health. It reminded me that genuine progress in public health depends on both technical skills and human values.



Acknowledgement

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