FUNDED POSTGRADUATE DIPLOMA
STUDENTSHIPS IN RESEARCH METHODS AVAILABLE

KEMRI | Wellcome

IDeAL Initiative to Develop African Research Leaders

Pwani UNIVERSITY

INTRODUCTION

This is a unique learning programme aimed at equipping recent graduates with both theoretical and practical knowledge of the philosophy and practice of research, i.e., key as one transitions to a research career or advances postgraduate training. The programme covers all types of health research, from basic biomedical and social science research to health system research. It provides an opportunity for students to develop a deep appreciation of the various research elements through attachment at a very dynamic, internationally renowned research institute/environment. Interns are physically located at the KWTRP campuses in Kilifi and Nairobi and are registered with Pwani University (PU) in Kilifi. The diploma programme constitutes several examinable taught modules, a research project and self-directed learning through participation in scientific meetings, including seminars and journal clubs. Each student is allocated to a researcher for both mentorship and supervision, selected on the basis of having submitted a plan for structured training in a particular research area. The three components run concurrently to enable interns to complete the programme in 10 months and graduate soon after. All related costs (registration, tuition, stipend) are facilitated by KWTRP through the IDeAL (Initiate to Develop African Research Leaders). Interns also receive medical cover contributions.

RECRUITMENT

KWTRP has established a very rigorous recruitment process – in 2 phases. First, applications are invited from anyone who completed their undergraduate training in the previous two years or will have graduated by the start of the programme. 100-150 applicants are selected to attend a research careers day in Nairobi. Careers Day involves talks and discussions on research and training activities - at KWTRP, PU and any other collaborating university/institution, as well as research as a career. This is followed by a written exam, which forms the basis for the second round of shortlisting. Subsequently, the top-scoring candidates are invited for an oral interview at either of KWTRP's campuses. Only successful candidates are contacted.

SCOPE OF SUPPORT

This is a 10-month studentship based at KEMRI-Wellcome Trust Research Programme. KWTRP and the Initiative to Develop African Research Leaders (IDeAL) will provide the selected candidate with a monthly stipend, medical insurance, and financial support to cover tuition, academic-related fees, and research expenses.

AVAILABLE RESEARCH PROJECTS

Interested candidates can apply to undertake any of the following research projects during their PGD training at KWTRP.

RESEARCH PROJECT 1

Understanding Health Challenges Among Older Adults: *An Explorative Study in the Bomani Community Using Mixed-Methods Approach*

The ageing population in Africa faces significant health challenges, with a high prevalence of chronic illnesses and non-communicable diseases (NCDs). These include diabetes, cardiovascular diseases, and respiratory conditions, as well as risk factors like obesity and hypertension (Wu et al., 2015). HIV epidemic further complicates health issues among older adults (Scholten et al., 2011). Despite these challenges, there's a notable lack of awareness and preparation for ageing-related health conditions in the region (Naidoo & Wyk, 2020).

Stigma plays a crucial role in the health outcomes of older adults. Studies show that up to 50% of older adults perceive societal stigma against mental illness, leading to lower help-seeking rates compared to younger populations (Preville et al., 2014). Self-stigma, where older adults internalise societal biases, further hinders access to care. Elder abuse is another critical issue, influenced by cultural backgrounds, modernisation, and the erosion of traditional values. In some African communities, there's a high prevalence of elder abuse with a gendered dimension. Family members and employers are often identified as significant perpetrators (Bigala & Ayiga, 2014)

This project aims to address these issues in the specific context of the Bomani Community. Focusing on local experiences of health challenges and stigma and their effects on health outcomes, this study will contribute to the development of targeted interventions and improved healthcare planning for the ageing population.

RESEARCH PROJECT 2

Identification of aetiology of TB-like illnesses for effective TB management and reduction of poor treatment outcomes due to untreated conditions

In addition to TB caused by *Mycobacteria tuberculosis*, recent epidemiological studies have shown the emergence of Non-Tuberculous Mycobacteria species (NTMs) causing lung disease in humans (Gopalaswamy et al., 2020). Several NTMs may cause pulmonary diseases, contributing to substantial morbidity and mortality (Gopalaswamy et al., 2020; Hoza et al., 2016). The clinical presentation of NTM disease is quite similar to TB, but NTMs often go undetected or are considered irrelevant clinically (Hoza et al., 2016; Hoang et al., 2021).

RESEARCH PROJECT 3

The seroprevalence of functional anti-shigellosis antibodies within the Kenyan population

Shigella is the leading cause of diarrhoea in children under 5 years. It causes a high burden of disease in low-and-middle-income countries (LMICs), where 70% of all cases occur [1]. Different Shigella species cause shigellosis; however, *S. flexneri (*serotypes 1b, 2a, 3a and 6) and *S. sonnei* are most prevalent in LMICs [2]. Natural exposure to *Shigella* induces serum serotype-specific antibody responses, which are associated with protection from repeated exposure. Serum IgG antibodies to different antigens, particularly the O-antigen on the lipopolysaccharide (LPS), are considered good markers of protection [3]. Antibodies may prevent shigella within the host by binding to and blocking bacterial growth. However,

antibodies are able to function through an array of other fc-mediated functions that recruit immune cells and complement, affecting anti-shigellosis activity [4, 5]. These fc-dependent functions are known to correlate with protection from disease within controlled human infection studies [6]. However, the seroprevalence and specific targets of functional anti-shigella antibodies within the Kenyan population are unknown [7, 8]. We will use an age-stratified sample set to profile Shigella-specific serum bactericidal antibody (SBA), opsonophagocytic killing antibody (OPKA) activity, antibodependent respiratory burst and complement fixation. In addition, antigen-specific Fc-dependent antibody levels to LPS and virulence proteins IpaB, IpaC, IpaD, IpaH, and VirG will be assessed.

RESEARCH PROJECT 4

The Role of fc Dependent Mechanisms in Vaccine-induced Protection among Adults Living in Malaria Endemic Areas

Malaria continues to be a major public health concern despite considerable investment. In 2022, there were an estimated 249 million cases, with approximately 608,000 malaria deaths (1). The approval of RTS, S/AS01B (MosquirixTM, GSK) and, more recently, R21/matrix M as candidate vaccines by the WHO have renewed hope for malaria control. Both vaccines are based on an immunodominant *P. falciparum* circumsporozoite protein (CSP)(2, 3). Despite demonstrable efficacy, both vaccines suffer from waning levels of protection and may require additional booster doses. Further, both fall below the >90% efficacy level required for malaria eradication. Therefore, the development of more efficacious next-generation vaccines is important. We used a controlled human challenge model to investigate vaccine-associated correlates of protection in adults living in a malaria-endemic region. Although licenced, a better understanding of R21/MM and/or RTS, S/AS01B antibody response and functions is important to inform future vaccine design. It is known that R21/MM and RTS, S induce a strong and sustained anti-NANP IgG response in both children and adults, which is associated with vaccine efficacy. However, the factors affecting variable vaccine efficacy in malaria-exposed adults remain incompletely understood. Antibody Fc-mediated mechanisms correlate strongly with protective immunity for *P. falciparum*. These include fixing and activating serum complement to enhance neutralisation and killing of malaria parasites and interacting with Fc-receptors (FcRs) expressed on phagocytes to promote cellular killing (opsonic phagocytosis and antibody-dependent cellular (4, 5). The goal of this project is to explore the level and durability of anti-NANP specific antibody-dependent functional antibodies using bead-based antigen-specific Fc-mediated functions adopted within our group.

RESEARCH PROJECT 5

Investigating the formation of red blood cell alloimmunization in sickle cell anaemia patients in Kilifi

Sickle cell anaemia (SCA) is an inherited red blood cell disorder that results in variant haemoglobin production (HbS). HbS tends to polymerise in low oxygen levels in the human body, leading to RBC sickling. SCA is a burden, especially in Sub-Saharan Africa (SSA), where at least 240,000 children are born with the condition every year. Approximately 50% to 90% of those born with the condition die undiagnosed before their fifth birthday [1]. In Kenya, the highest frequencies are found at the coast and areas surrounding Lake Victoria.

SCA patients rely on blood transfusion for disease management. However, this therapy is associated with the risk of alloimmunisation, which is the formation of alloantibodies by the recipient of foreign RBC antigens [2]. The WHO recommends extended matching for RBC

antigens considered clinically significant (kell, Kidd, etc.) before transfusion. However, in Kenya, pre-transfusion tests are only done on the major blood groups, ABO and Rhesus D. Alloimmunisation predisposes the patients to the risk of haemolytic transfusion reactions and in pregnant mothers, haemolytic disease of the foetus and newborn which can potentially cause serious morbidity and mortality in SCA patients. The detection of the alloantibodies depends on the different evanescence rates in the patient, and without post-transfusion follow-up, some of the alloantibodies may be missed.

This study aims to screen SCA patients for alloantibodies prior to and after transfusion. It will also determine the phenotypic profiles of both the donors and SCA patients and monitor the patients' resolution of anaemia during hospitalisation. We will hopefully identify factors that increase the risk of alloimmunization and provide evidence supporting enhanced donor-recipient matching and improved transfusion protocols for managing sickle cell anaemia (SCA).

RESEARCH PROJECT 6

Developing better, faster insights from the DHISv2 analytics platform using patient-level hospital datasets

With 50+ Ministries of Health globally working with DHISv2, optimising the use of DHISv2 for decision-making at different levels in the health system is vital for routine clinical surveillance and health service planning and delivery, ranging from the influencing of policy to the programming of action. The rationale is that better quality data that are both relevant and comprehensive will increase the use of these data in action and decision-making, ultimately improve health service delivery and health outcomes, and identify and mitigate against emergent health crises, e.g. COVID-19. However, neither ownership of nor access to good quality data guarantees the actual use of clinical data collected from routine care. To ensure information use, relevant data need to be collected, processed, and analysed in an accessible format. This problem of underused data, and indeed the absence of data use entirely from routinely provided care outside vertical programmes (e.g. TB, HIV, Malaria, Immunisation, etc.), is widespread and has been evident for decades. For meaningful comparisons of actual performance between hospitals, for benchmarking and identification of best practices, and meaningful clinical surveillance of diseases and mortality, a comprehensive dataset of case mix factors should, therefore, be collected and accounted for at the individual patient level. Presently, within the Kenyan context, there is limited rigorous exploration of the ways DHISv2 can harness patient-level data from routine care outside vertical programmes for use in routine decision-making and subsequent programming of action.

The objective of this internship is to explore the feasibility of conducting syndromic surveillance for all facility admissions using the DHISv2 tracker and DHISv2 analytics modules.

RESEARCH PROJECT 7

Implementing Quality Assurance/Quality Control (QA/QC) tools and processes for hybrid paper-to-digital data processes in public health facilities

With 50+ Ministries of Health globally working with DHISv2, optimising the use of DHISv2 information is necessary for routine clinical surveillance and health service planning and delivery to influence policy and programming of action. Due to the severe resource constraints facing Kenyan public hospitals, it is unlikely that electronic health records can be implemented to reasonably support routine hospital care in the short- and mid-term while adequately

addressing the varying needs of the different types of clinicians. Almost all facility-based patient-level records are paper-based. A hybrid paper-to-digital data pipeline using AI/OCR technologies that starts with clinicians filling out paper records and ends with the information in DHISv2 is necessary for generating insights needed for routine decision-making. Such data pipelines are important since they can process clinical data in multiple formats from distributed data sources with minimal resources and effort while enhancing the health system's responsiveness to population needs. The rationale is that better quality data will increase the use of these data in decision-making and ultimately improve health service delivery and health outcomes. However, there are challenges and opportunities in implementing clinical data pipelines. Still, practical implementation experiences are seldom reported, arguably due to successful implementation examples of paper-to-digital data pipelines in public hospitals in contexts similar to Kenya.

The objective of this internship is to explore ways to implement a technically feasible paper-to-digital data pipeline with integrated data quality control mechanisms for use in public health facilities.

RESEARCH PROJECT 8

Understanding barriers to HPV vaccine uptake among adolescents to improve vaccine uptake

Background Globally, cervical cancer poses a significant public health problem. According to the World Health Organization (WHO), in 2020 alone, an estimated 604,000 new cases and about 342,000 deaths occurred (http://bit.ly/41uiTyS). Approximately 90% of these cases and deaths are in low and middle-income countries. In Kenya, cervical cancer is the second leading cause of death after breast cancer(https://bit.ly/3fbzi7M). Increased uptake of the effective human papillomavirus (HPV) vaccine is the key to controlling cervical cancer (https://bit.ly/3SDYlPd). In Australia, vaccine-type HPV infections and pre-cancerous lesions reduced significantly when HPV vaccination coverage was 80% and 76% in females and males, respectively (Patel et al. 2018). In Africa, Rwanda has achieved coverage of up to 95% with the HPV vaccine, and this success has been attributed to the country's robust health systems and school strategy (Binagwaho et al. 2012). In 2019, Kenya introduced facility-based HPV vaccination for 9-14-year-old girls, with community and school mobilisation by teachers and identified community members. There has been a backslide in the first dose, with the second dose having even lower coverage. This study will apply the World Health Organization (WHO) Measuring Behavioural and Social Drivers (BeSD) of the vaccination framework to understand the barriers and facilitators of Human Papillomavirus vaccine uptake in Kwale and Mombasa counties of Kenya.

Methods The study design will be cross-sectional, and quantitative and qualitative data will be collected. We will sample girls aged 10-14 who are eligible to receive the HPV vaccine across the two counties. A mix of interviews, in-depth discussions, and focus group discussions will be conducted with purposively selected participants. The concurrent triangulation method will be applied for cross-validation and corroboration of the findings within the study.

Significance Understanding the barriers and facilitators to HPV vaccination will help Policymakers use best practices to improve uptake.

RESEARCH PROJECT 9

Pre-eclampsia Among Pregnant Women Attending Antenatal Care in Kilifi County

Pre-eclampsia (PE) and other hypertensive disorders during pregnancy are linked to higher rates of morbidity and mortality in both mothers and newborns. For PE to be effectively treated and managed, early identification is essential(Ndwiga et al., 2020)l. Pre-eclampsia prediction based on blood pressure, presence of protein in the urine, symptoms and laboratory test abnormalities can result in false-positive diagnoses. This may lead to unnecessary antenatal admissions and preterm delivery. Blood tests that measure placental growth factor (PlGF) or the ratio of soluble fms-like tyrosine kinase 1 (sFlt-1) to PlGF could aid the prediction of PE if either were added to routine clinical assessment or used as a replacement for proteinuria testing(Frampton et al., 2016). The World Health Organisation (WHO) suggests supplementing with calcium to prevent PE(Omotayo et al., 2018); however, the factors influencing pregnant women's acceptance and acceptability of these recommendations have not been investigated within Kilifi County have not been examined.

RESEARCH PROJECT 10

Identifying whether cases of severe pneumonia presenting to Kilifi County Hospital are bacterial or viral in aetiology using a predictive model incorporating lab and clinical signs/ symptoms

In order to guide the rational use of antibiotics and prevent antimicrobial resistance, we need to be able to identify whether cases of severe pneumonia that present to the hospital are of bacterial aetiology (and therefore may benefit from antibiotic therapy) or viral and, therefore, need supportive care. Much work has been done to identify potential biomarkers of bacterial disease; however, each biomarker has limited sensitivity and specificity. This project will combine all the available data, including laboratory markers and clinical signs and symptoms, to build a predictive statistical model of severe bacterial pneumonia and test how well this model predicts cases of known bacterial aetiology. The result will be a subset of factors or a score that can be used at the bedside to identify a probability that the case is bacterial compared to viral or other aetiology.

RESEARCH PROJECT 11

The Ethics of COVID-19 Vaccine Donations from HICs to LMICs: *A Document/Media Review*

The COVID-19 pandemic has exacted an enormous toll on both human life and economies throughout the world. Several safe and effective COVID-19 vaccines were developed at remarkable speed. However, global access to and implementation of these vaccines was unequal, with countries in Sub-Saharan Africa having particularly low vaccination rates. To improve equity in access to COVID-19 vaccines, low-and-middle-income countries (LMICs) were left with three options: purchase vaccines from the global market (to the extent that they can afford it), access them through multilateral mechanisms, notably COVAX and/or receive them as donations from wealthier countries, either through multilateral mechanisms or through bilateral agreements. COVID-19 vaccine donations from wealthier to poorer countries can have major benefits. Yet, there is relatively little empirical information about the overall effects of such donations, including the predominant discourses by the media and the associated ethical issues.

RESEARCH PROJECT 12

Examining and improving evidence support systems at the national level in Kenya

Globally, there have been significant efforts to enhance the use of evidence to inform policymaking. For instance, the World Health Organization has supported the Evidence Informed Policy Network to connect researchers with health policymakers and to advance the use of evidence-based tools, such as systematic reviews and policy briefs. Similarly, the Alliance for Health Policy and Systems Research has advocated for greater incorporation of research evidence into health policymaking, particularly in low-income settings. However, most of these efforts have focused on increasing policymakers' exposure to research products and developing tools to support individuals and groups in enhancing evidence use. There has been comparatively less focus on establishing or improving the entirety of national systems of evidence provision that serve national decision-making from a holistic perspective.

In Kenya, there is a limited but growing body of research on the use of evidence to inform health sector decision-making. However, similar to global trends, this research has predominantly concentrated on evidence use within specific policy decisions rather than the entire evidence ecosystem within the Kenyan health sector. This studentship aims to address this gap by holistically examining the existing evidence support systems at the national level in Kenya, including identifying gaps and proposing strategies for improvement. In doing so, the project seeks to enhance the comprehensive and consistent integration of research findings into health policy and planning, ultimately fostering a more effective and responsive health system in Kenya.

RESEARCH PROJECT 13

Wider Clinical Impacts of Malaria-Protective Human Genetic Variants

Several human genetic traits have been shown to strongly protect against malaria, such as sickle cell trait (HbAS), the rare Dantu blood group variant, alpha thalassaemia, blood group O, and G6PD deficiency. However, the wider clinical consequences of these variants and their impacts on immune response are not well characterised.

We aim to analyse the wider health impacts of these malaria-protective variants by investigating the association between these variants and ward admission events in ~20,000 ward admission cases. We will extract DNA and genotype of these SNPs in the 20,000 samples and use logistic regression analyses to investigate the relationship between these variants and other clinical diseases. This will enable a better understanding of the wider clinical impacts of genetic variants that are strongly protective against malaria.

We will also investigate the impact of these variants on immune response by isolating monocytes from peripheral blood mononuclear cells (PBMCs) collected from individuals across genotype groups, and stimulate them with laboratory parasite strains to investigate the variation in inflammatory response evoked. We will use flow cytometry to measure the activation and adhesion markers on monocytes, and pro-inflammatory cytokines produced in the culture supernatant.

APPLICATION PROCEDURE

You can apply for two positions in one application by applying for the research project you're mostly interested in (1st preference) and then specify a 2nd preference when completing your application. Note that this is only applicable when several research projects are advertised.

1. A link to apply will be available at the bottom of the page.

2. Click on the submit application link and complete the resulting form. You'll need to create an account and update your profile before applying for the preferred position.

APPLICATION DEADLINE: 11th September 2024.

ONLY ONLINE APPLICATIONS will be accepted.

The studentship will commence in **January 2025.**

For further information on course specification, recruitment, and application, please visit the **Postgraduate Diploma portal** on the KEMRI-Wellcome Trust website at https://jobs.kemri-wellcome.org/article/pgd-positions-advertisements

The application deadline is September 11th, 2024. **Please note that only online applications will be accepted. Apply through the Google form using the following link embedded herein: Click to apply**