T2-PSL-v19.0

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Developing a critical mass of Data Scientists and Mathematical Modelers to Support NMCPs

Samson Kiware, Ph.D.

sskiware@ihi.or.tz, samson.kiware@pamca.org

May 25, 2023

IDM Symposium, Seattle

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PAN-AFRICAN MOSQUITO CONTROL ASSOCIATION

PAMCA

T2-PSL-v19.0

VCOM | Partners Models Or Other projects | MosquitoDB | Model GUIs | Statistical Analysis | Various Projects

Post - Doc | Senior Programmer | Post-Doc

Mathematical Modellers | Software Developers | ML/AI Experts

Data Analysis Skills

PROJECTS

TECHNICAL SUPPORT (NMCP & ZAMEP)

PROGRAMS

Research | Ethics| Malaria Transmission | Control & Elimination Strategies | Presentations | Grant Applications

Informal ⇢ Formal

Internship | Short Courses | Ext Labs

At least one year to acquire research skills

BSc Research | MSc Research | PhD Research

Pictures taken during bi-weekly team presentations

20+ Members

A Gender – Balanced Team

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MosquitoDB

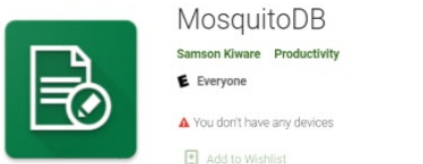
Mosquito Database Management System

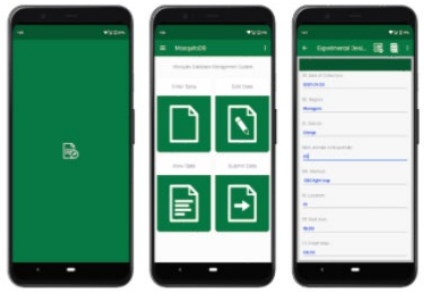
www.mosquitodb.io

App in Google Store

Vector borne diseases

1





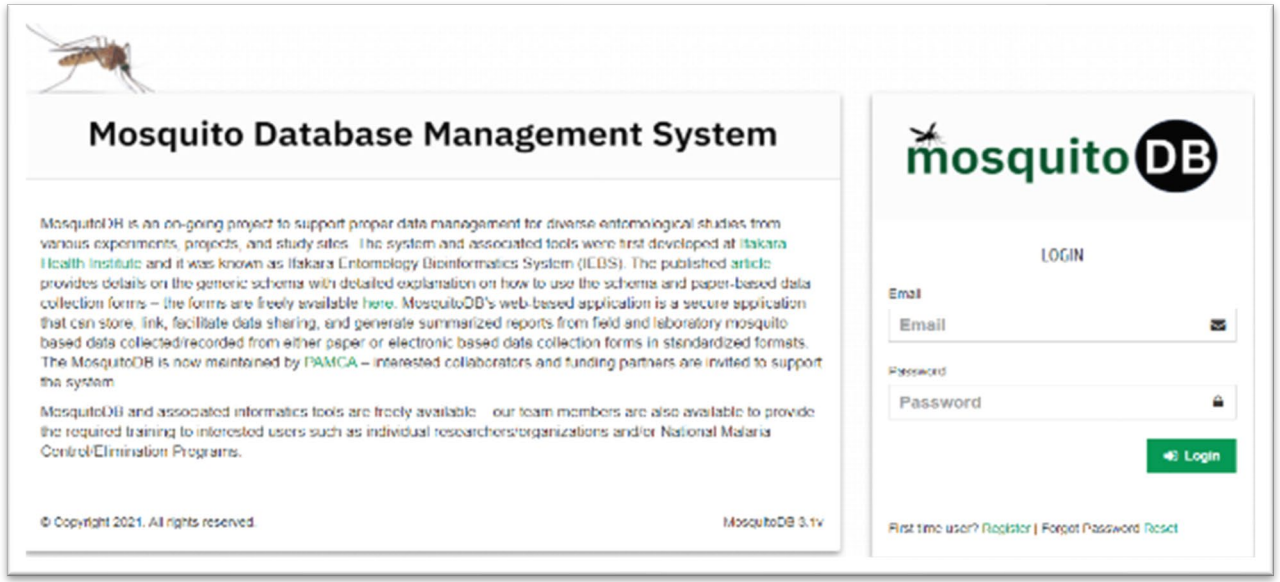
Immature

Adults

Laboratory analysis

Insecticide Resistance

2



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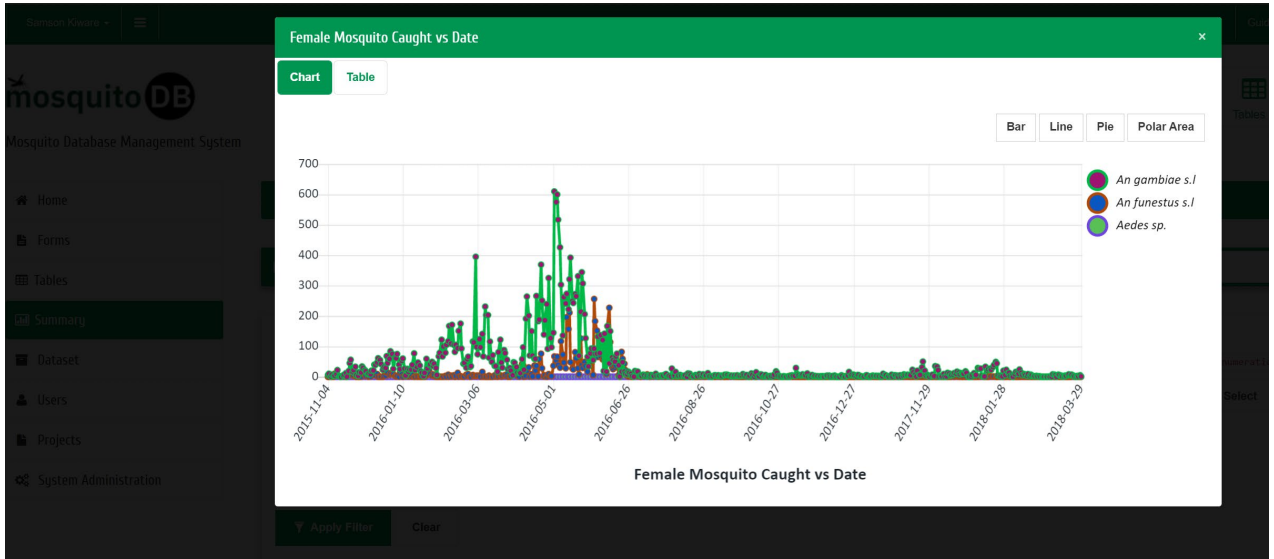

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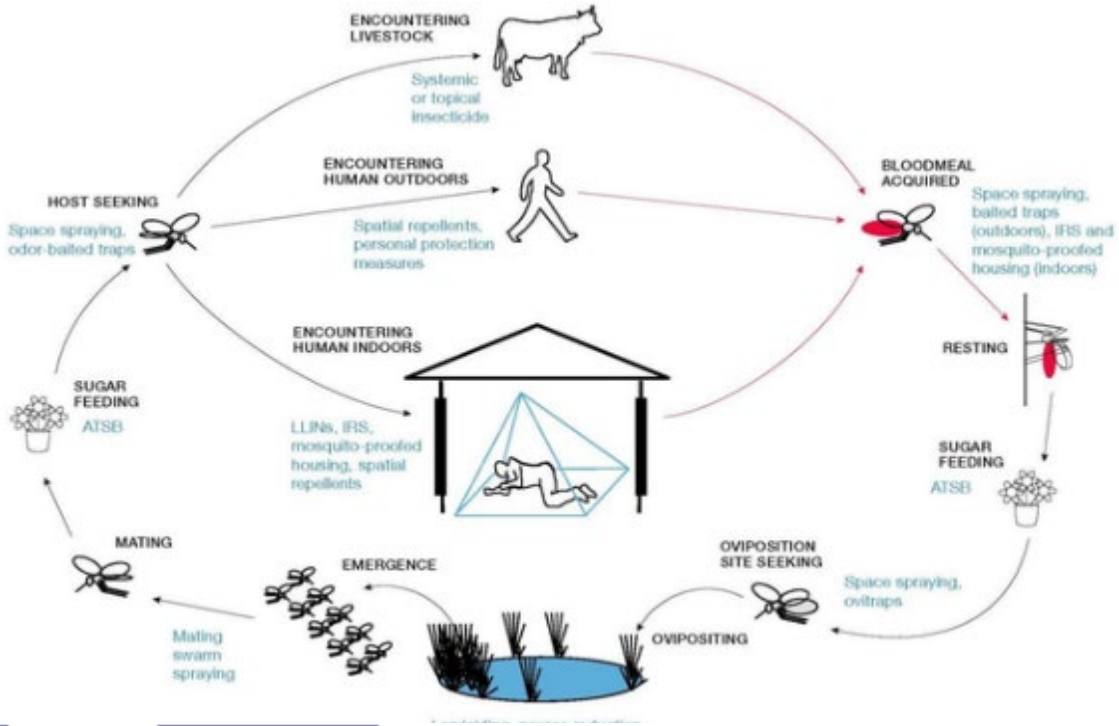
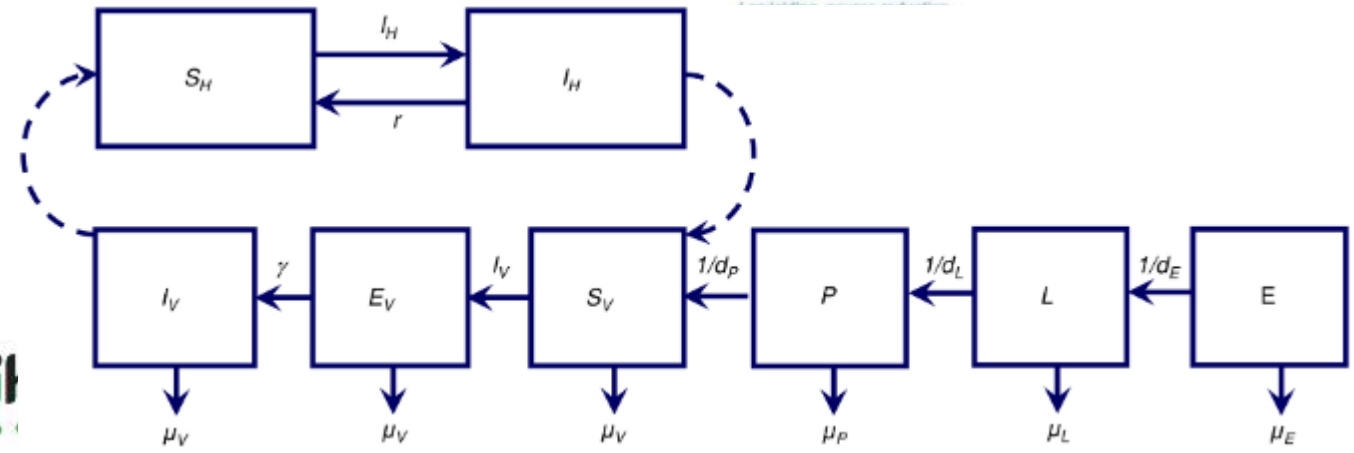
Vector Control Optimization Model (VCOM)





PLOS ONE

RESEARCH ARTICLE

Attacking the mosquito on multiple fronts: Insights from the Vector Control Optimization Model (VCOM) for malaria elimination

Samson S. Kiware[1,2]*, Nakul Chitnis[3,4], Allison Tatarsky[5], Sean Wu[6], Héctor Manuel Sánchez Castellanos[6,7], Roly Gosling[5], David Smith[8], John M. Marshall[6]

1 Environmental Health and Ecological Sciences Department, Ifakara Health Institute, Morogoro, Tanzania, **2** Mathematics, Statistics, and Computer Science Department, Marquette University, Milwaukee, Wisconsin, United States of America, **3** Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel, Switzerland, **4** University of Basel, Basel, Switzerland, **5** Malaria Elimination Initiative, Global Health Group, University of California San Francisco, San Francisco, California, United States of America, **6** Divisions of Biostatistics and Epidemiology, University of California, Berkeley, California, United States of America, **7** School of Medicine, Tecnologico de Monterrey, Atizapan de Zaragoza, Estado de Mexico, Mexico, **8** Department of Global Health, University of Washington, Seattle, United States of America

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OPEN ACCESS

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Editor: Pedro L. Oliveira, Universidade Federal do Rio de Janeiro, BRAZIL

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Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Funding: SSK acknowledges financial support from a Wellcome Trust Training Fellowship grant # 107599/Z/15/Z. HS and JM acknowledges financial support from UC-MEXUS grant. This work was supported by the University of California, San Francisco, Group Health Group Malaria Elimination Initiative through funding from The Parker Foundation. The funders had no role in study

Abstract

Background

Despite great achievements by insecticide-treated nets (ITNs) and indoor residual spraying (IRS) in reducing malaria transmission, it is unlikely these tools will be sufficient to eliminate malaria transmission on their own in many settings today. Fortunately, field experiments indicate that there are many promising vector control interventions that can be used to complement ITNs and/or IRS by targeting a wide range of biological and environmental mosquito resources. The majority of these experiments were performed to test a single vector control intervention in isolation; however, there is growing evidence and consensus that effective vector control with the goal of malaria elimination will require a combination of interventions.

Method and findings

We have developed a model of mosquito population dynamic to describe the mosquito life and feeding cycles and to optimize the impact of vector control intervention combinations at suppressing mosquito populations. The model simulations were performed for the main three malaria vectors in sub-Saharan Africa, *Anopheles gambiae s.s*, *An. arabiensis* and *An. funestus*. We considered areas having low, moderate and high malaria transmission, corresponding to entomological inoculation rates of 10, 50 and 100 infective bites per person per year, respectively. In all settings, we considered baseline ITN coverage of 50% or 80% in addition to a range of other vector control tools to interrupt malaria transmission. The model was used to sweep through parameters space to select the best optimal intervention packages. Sample model simulations indicate that, starting with ITNs at a coverage of 50% (*An. gambiae* s.s. and *An. funestus*) or 80% (*An. arabiensis*) and adding interventions that

Application of VCOM: Example

ELSEVIER

Current Research in Parasitology & Vector-Borne Diseases

Volume 3, 2023, 100107

Spatial repellents: The current roadmap to global recommendation of spatial repellents for public health use

Nicole L. Achee [a], T. Alex Perkins [a], Sean M. Moore [a], Fang Liu [b], Issaka Sagara [c], Suzanne Van Hulle [d], Eric O. Ochomo [e], John E. Gimnig [f], Hasitha A. Tissera [g], Steven A. Harvey [h], April Monroe [i], Amy C. Morrison [j], Thomas W. Scott [k], Robert C. Reiner Jr. [l], John P. Grieco [a]

Show more

Application of Vector Control Optimization Model (VCOM's) on eave ribbons for malaria vectors control in Kilombero Valley, Tanzania

Ismail Nambunga, MSc

Graduated from University of Glasgow

Background

- 2000 - 2015, malaria incidence decreased by 40% in SSA
- ITNs & IRS being the main drivers
- Still residual transmissions exist
- Impact of combining ITNs and eave ribbons was modelled
- Kilombero Valley – study area

Objectives

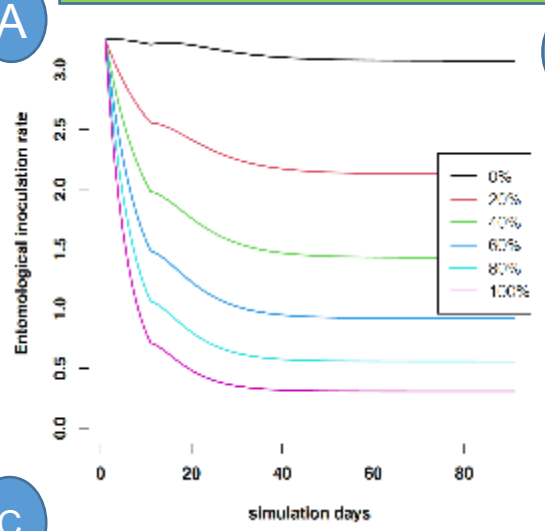
1. Assessing the impact of Eave ribbon + ITNs on transmission mediated by *An. funestus* & *An. arabiensis*.
2. Assessing the impact of Eave ribbon + ITNs on the combined transmission by *An. funestus* & *An. arabiensis*

Methodology

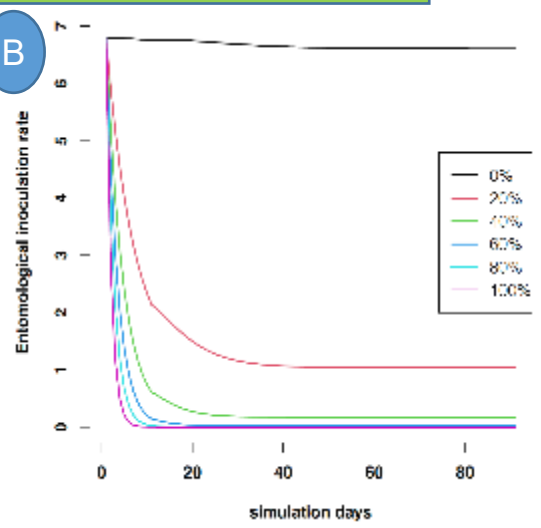
- VCOMs was extended and updated
- Parameters extraction
- Simulating the impact of eave ribbons + ITNs on *An. funestus* & *An. arabiensis*
- Simulating the impact of eave ribbons + ITNs on the combined transmission

Results

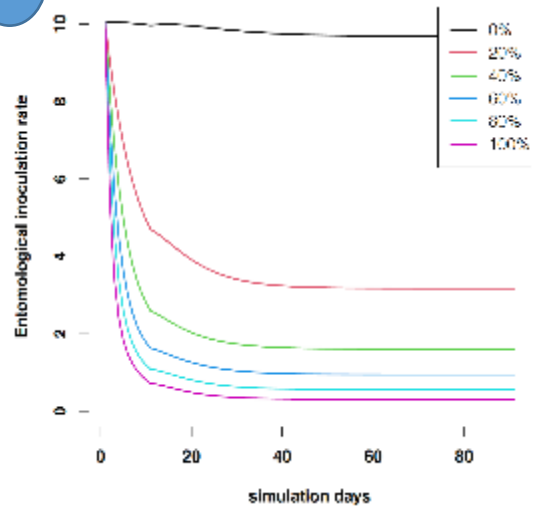
A



B



C



A. The impact of Eave ribbon + ITNs on *An. arabiensis*.
- High coverage of eave ribbon **(~ 60%)** is needed

B. The impact of Eave ribbon + ITNs on *An. funestus*
- Small coverage is needed **(~ 20%)**

C. The impact of Eave ribbon + ITNs on the combined transmission
- High coverage is needed **(60%)**

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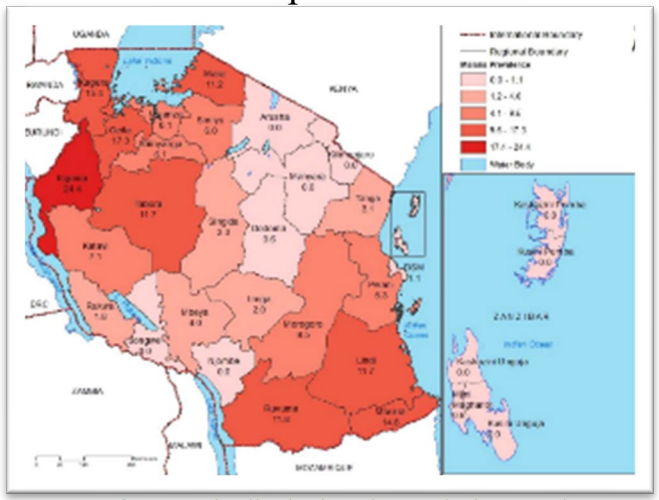
Presentation: 11:00- 1230
Elliot Bay

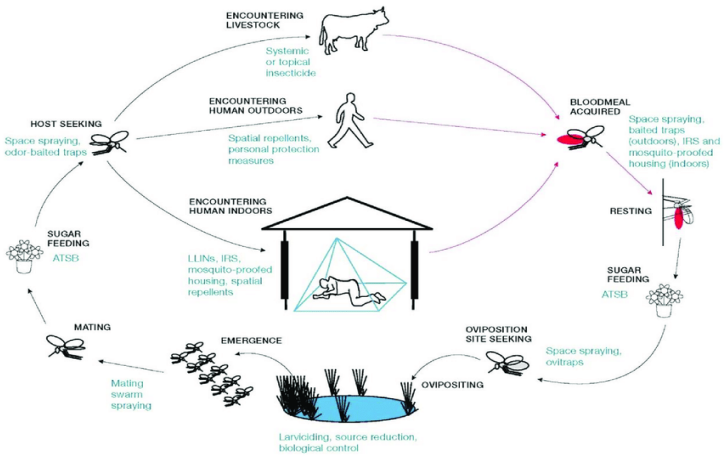
Investigating the impact of larviciding as a supplementary malaria vector control tool in rural South Eastern Tanzania: Simulation Study

INTRODUCTION

- The protective effect of insecticide-treated nets (ITNs) and indoor residual spraying (IRS) is limited by the fact that they target mosquitoes solely indoors
- Models can provide initial insights into combinations of interventions by exploring their synergies in a quantitative way, especially in the absence of empirical evidence



Map of Tanzania displaying the malaria prevalence (Brieger *et. al*, 2018)

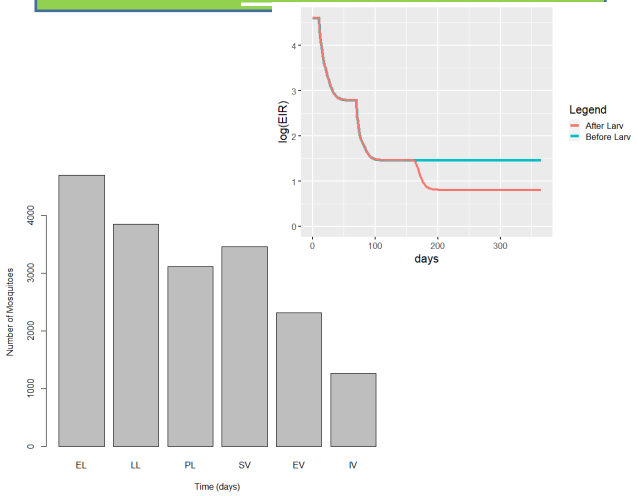


Schematic figure for mosquito life and feeding cycle (Kiware et al., 2017)

METHODOLOGY

- Project took place in Rufiji district, Tanzania
- 2 phases included : Baseline data and Intervention data used to estimate parameters
- Mathematical Model used to access the impact of larviciding

RESULTS



EIR Simulation and Bar plot for Mosquito population

INCLUDING SEASONALITY EFFECT IN THE MODEL

- The model is extended to see the impact of seasonality in the vector control:
  - Temperature
  - Rainfall

Ms. Gloria Salome G. Shirima
Research Scientist

BSc: Actuarial Sciences (UDSM)
MSc: Mathematical Sciences (AIMS, Rwanda)

PhD Student

Presentation: 145- 315
Elliot Bay

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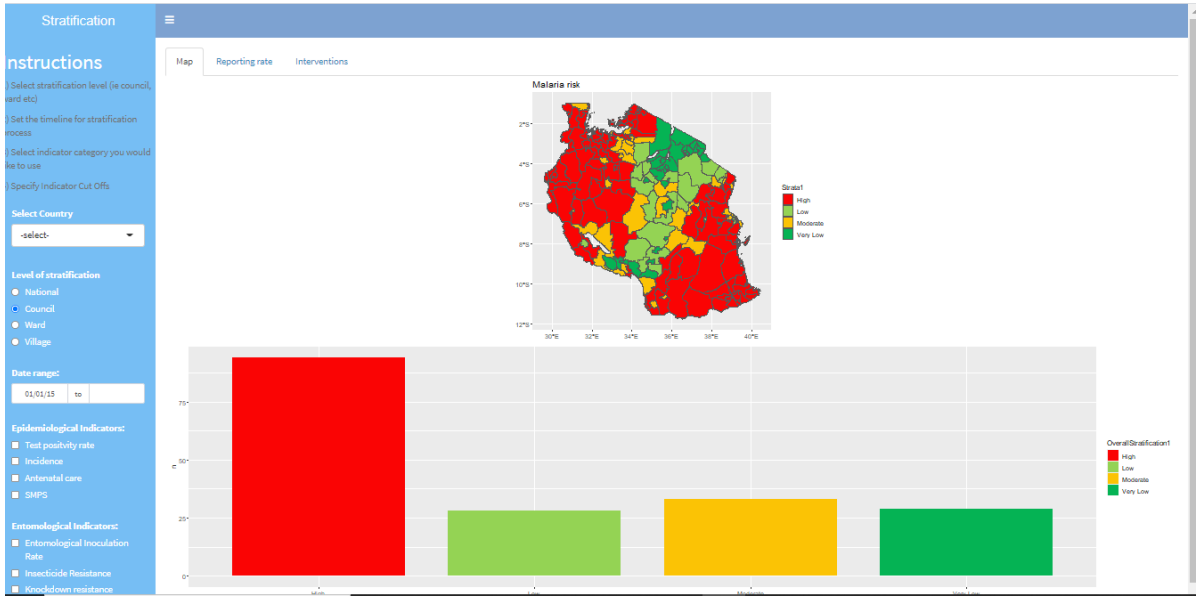
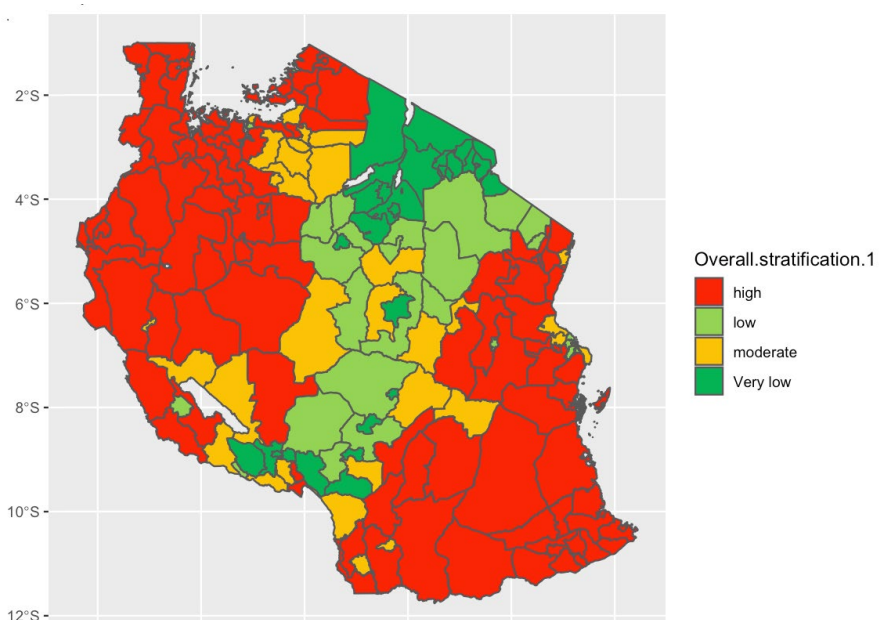
Malaria Micro-stratification Dynamic Tool

- Under development
- Stratification - transmission
  - Low
  - Medium
  - High
- Stratification -
  - National
  - Sub-national level
  - Epidemiological indicators
  - Entomological indicators
  - Flexibility in data sources
  - Environmental factors
  - Other factors
  - Ability to re-define cut-off point



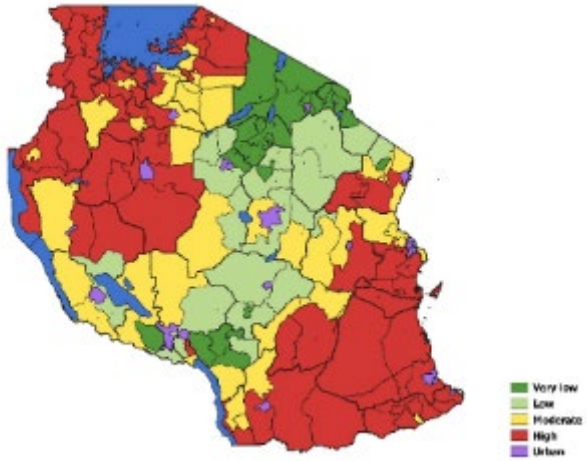


Analysis and Simulation of Malaria Control Intervention in Tanzania: A tool for Subnational Tailoring of Intervention.

Motivation

- In the last decade, the malaria burden has substantially decreased globally.
- However, in recent years the decline in malaria burden has stagnated.
- Intensified efforts are needed, especially in high burden countries in Sub-Saharan Africa (Tanzania).
- The achievement of the past years are challenged by insufficient coverage rates in all interventions.
- Due to limited resources, it is important to define appropriate mixes of interventions according to different (Councils) strata.
- Targeted intervention at sub-national level in order to prioritize and efficiently allocate resources

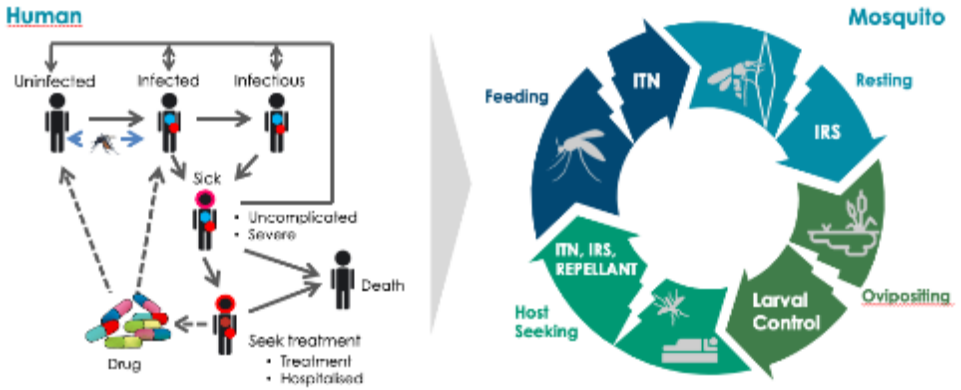
Overall distribution of Councils by risk strata



Study Objectives

1. To predict the impact of the intervention as included in NMSP 2021-2025
2. To determine the most impactful and the most cost-effective intervention allocation.
3. To determine the appropriate mixes of interventions for meeting specific expected targets.
4. To suggest the alternative interventions which are most impactful and most cost-effective.

OpenMalaria Simulation platform



Nicholaus Mziray
Research Scientist
BSc: (SUA)
MSc: (AIMS)
PhD Student
PhD Scholarship (Swiss TPH & IHI)

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T2-PSL

Miss Asiya Mbarawa
Research Officer

BSc: Computer Systems engineering (University of Sheffield, UK)
MSc: Data Science (Kings College London, UK) - Ongoing

Employment Status: March 2021

Support: 100%

A Dynamic Malaria Stratification R shiny tool

MOTIVATION

Malaria risk stratification can be utilised to guide intervention planning and resource allocation in malaria control and elimination initiatives.
The current stratification process only uses epidemiological indicators to stratify risk. This project aims at automating and expanding the current process by creating a tool that includes entomological indicators. Creating a tool that allows policymakers and researchers to visualise malaria risk is essential to identify malaria high-risk locations in order to take appropriate action.

KEY INDICATORS

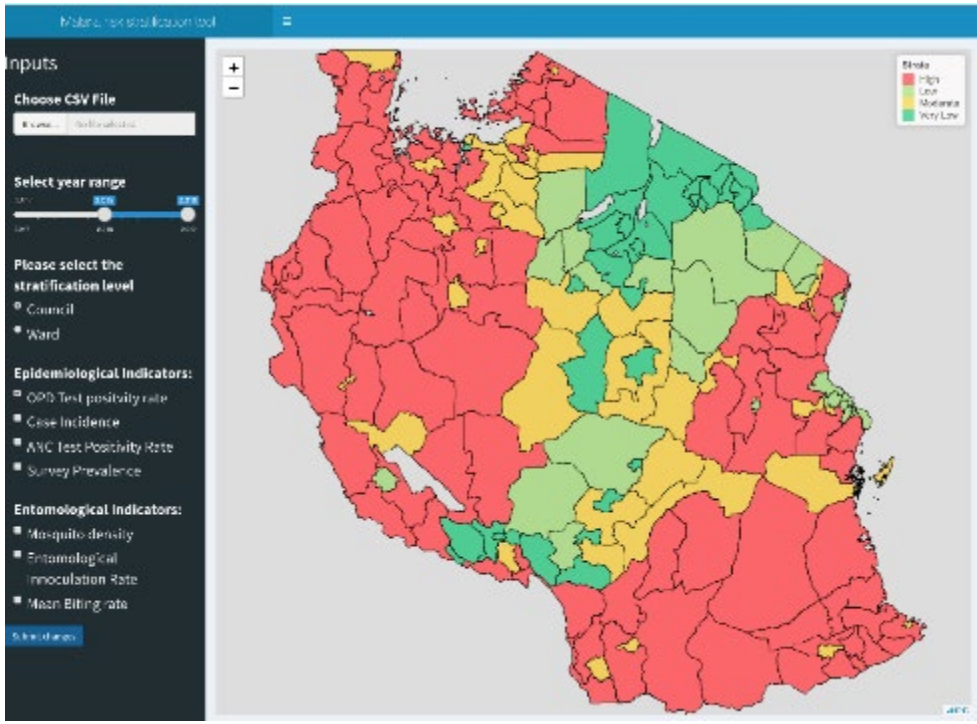
Epidemiological

- Test Positivity Rate
- Antenatal Care test positivity rate
- School Parasitological Malaria Survey prevalence rates
- Malaria Case Incidence Rates

Entomological

- Human biting rate
- Mosquito density
- Sporozoite rate
- Entomological inoculation rate

DEMO



Modelling to optimize malaria vector control at low mosquito population densities

Motivation

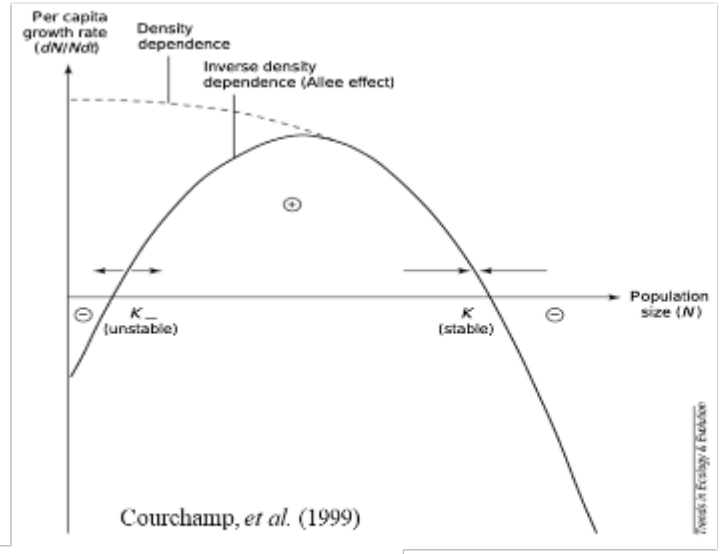
- Mosquito populations seem to be density-dependence, meaning per capita growth rate is fastest when density is very low. However, an inverse density-dependence known as Alle effect is also possible
- The occurrence and relative importance of Allee effects in regulating mosquito populations is still unknown.
- Therefore, understanding the extent to which Allee effects impact mosquito populations is critical to predicting whether populations pushed close to extinction by interventions such as larvicide application will rebound or die out.

Study Objectives

Generally, to determine the effectiveness of malaria vector control intervention at low mosquito population densities through the combination of theoretical and statistical modelling approaches. Specifically;

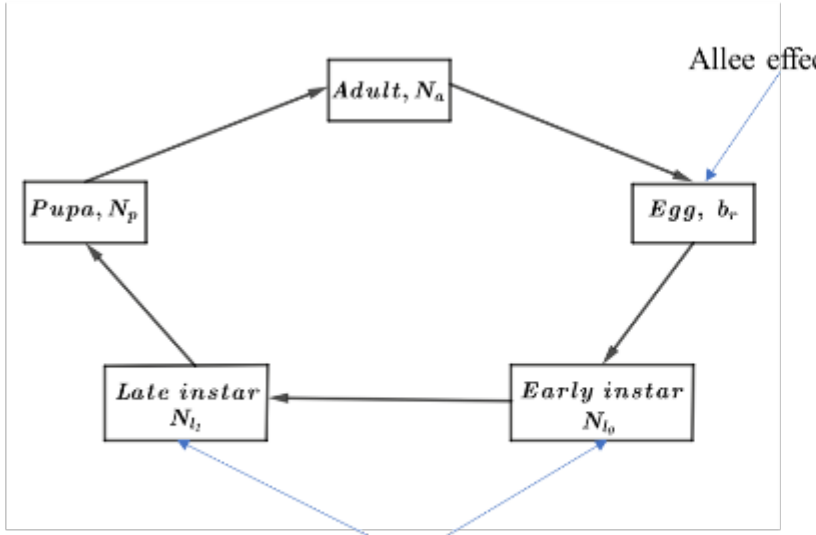
1. To determine the role of density dependence and Allee effect in regulating mosquito population
2. To examine whether density-dependence or Allee effect impacts sustained or short-termed intervention in regulating malaria vectors
3. To determine the trade-offs between density-dependence and Allee effect in regulating mosquito population

Low density population dynamics



Courchamp, *et al.* (1999)

Mosquito's life cycle



Mr. Andrea Kipingu
Research Scientist
PhD Student

BSc: with Education – **SUA**

MSc: Mathematical Sciences
AIMS – Rwanda

PhD: Infectious Diseases
Ongoing at U*of*G, UK

PhD scholarship 2020

Presentation: 145- 315
Elliot Bay

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Improving the Design of Vector Control Trials

University of Glasgow › School of Biodiversity, One Health & Veterinary Medicine

This project is no longer listed on FindAPhD.com and may not be available.

Click here to search FindAPhD.com for PhD studentship opportunities

Dr H Ferguson

No more applications being accepted

Competition Funded PhD Project (Students Worldwide)

Victoria Githu
Research Scientist

BSc: Actuarial Sciences
MSc: Mathematical Modelling
UDSM

Co- Team leader

Presentation: 11:00- 12:30
Elliot Bay

Extending Vector Control Optimization Model (VCOM)

QUANTITATIVE ECOLOGY & RESOURCE MANAGEMENT
UNIVERSITY *of* WASHINGTON
College of the Environment

March 2, 2023

Dear Victor Mero,

I am pleased to offer you admission to the Quantitative Ecology and Resource Management (QERM) graduate program beginning Autumn 2023! The admissions committee is extremely impressed by your academic accomplishments and feel as though you will be a great addition to the vibrant QERM community. We are confident that QERM is uniquely and ideally suited to meet your academic and career goals. Your appointment is in the Ph.D. track.

THE GRADUATE SCHOOL
UNIVERSITY OF NOTRE DAME

Graduate Enrollment Management
110 Bond Hall
Notre Dame, IN 46556-5602

W graduateschool.nd.edu
E GradApp@nd.edu
P 574-631-7706

Tuesday, February 21, 2023

Mr. Victor Mero
Mjimwema, Kigamboni
Dar Es Salaam, Dar es Salaam 14902
Tanzania

Dear Mr. Mero,

Congratulations! On the recommendation of the Department of Biological Sciences (and if applicable, contingent upon receipt of your official test scores at a satisfactory level and of your official transcripts showing conferral of your degree), we are pleased to admit you formally into the Graduate School of the University of Notre Dame to pursue work toward the Doctor of Philosophy degree, beginning with the Fall 2023 semester.

UNIVERSITY OF CALIFORNIA, BERKELEY

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO

SANTA BARBARA • SANTA CRUZ

OFFER ACCEPTED

Lisa García Bedolla
Vice Provost for Graduate Studies and
Dean of the Graduate Division
University of California, Berkeley
424 Sproul Hall
Berkeley, CA 94720-5900

March 17, 2023

Dear Victor A. Mero,

Congratulations! I am delighted to offer you admission to graduate study in the Epidemiology PhD program, beginning Fall 2023. Please accept my warmest congratulations on the many accomplishments and achievements that have earned you admission to this unique institution. We hope that you will accept our offer.

Berkeley is an incomparable place to earn a graduate degree. You will have the opportunity to work with and learn from a world- renowned and devoted faculty, alongside diverse and talented student colleagues. As a Berkeley graduate student, you will join a vibrant scholarly community that will support you in pursuing your particular academic or professional interests. In addition, you will be able to take advantage of a wider intellectual context engaged in cutting-edge teaching, research, professional activities, and public service in more than 100 top-ranked graduate programs.

Victor Mero, Msc
Data Scientist and Math Modeller

Co-Team Leader

pidemiology PhD student
(UC Berkeley)

Machine Learning approach for detection and classification of malaria foci in areas targeted for malaria elimination

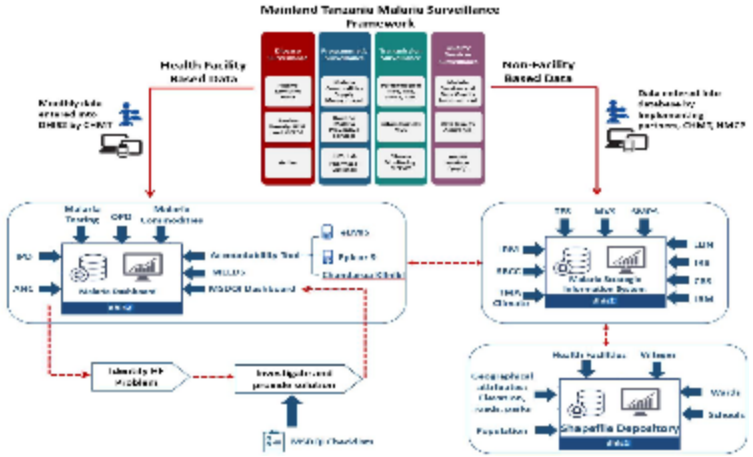
Motivation

- Existing malaria surveillance systems in Tanzania are challenged with limited capacity to detect malaria cases aberration in traditionally rare occurrences of malaria
- The systems now have massive multidimensional data (big data) for traditional analysis techniques that are supposed to detect and alert public health official aren't sensitive and/or specific enough to catch such aberrations. Machine Learning techniques are adept to handling big data and discover hidden insights/patterns

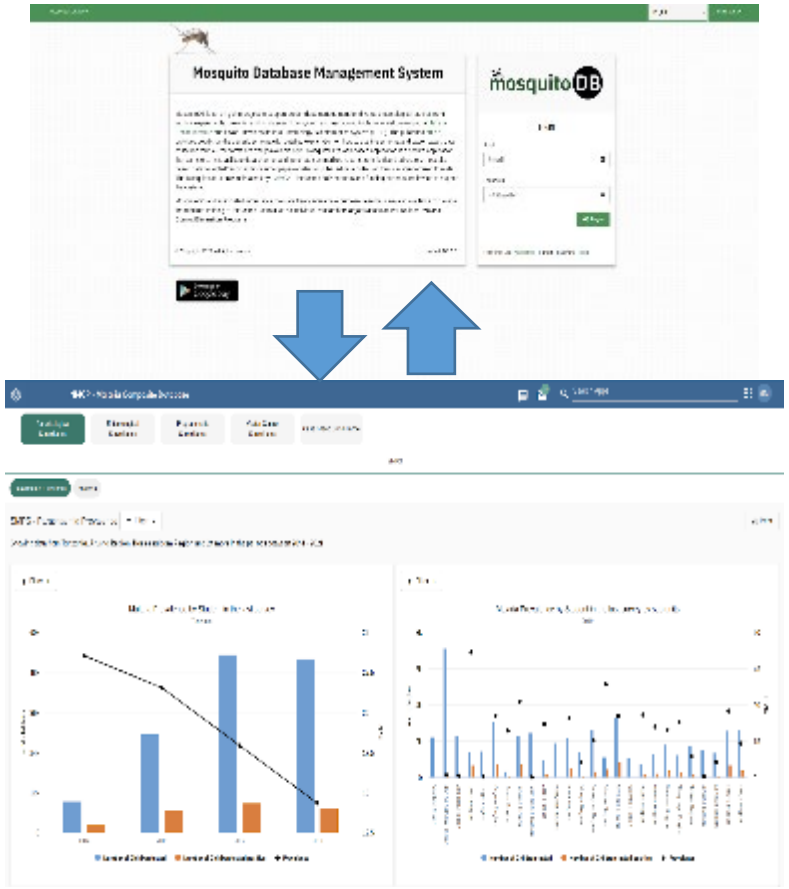
Study Objectives

- To strengthen malaria surveillance system by developing machine learning algorithm for early warning of aberration of malaria cases in low transmission areas to support malaria elimination intervention

Frame work



Interoperability of MosquitoDB and DHIS2



Bernard Noel Mussa

Bsc. Computer Science (UDSM)

MSc. Information and Communication Science and Engineering (NM-AIST)

Employment at IHI:

Research Scientist - Jan 2022

PhD in Data Science Student at University of Dar es Salaam (UDSM)

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Assessing shifts in biting patterns of *Anopheles gambiae* and *Anopheles funestus*, the major malaria vectors in Southeastern Tanzania

INTRODUCTION

Long-lasting Insecticidal Nets (LLINs), and Indoor Residual Spraying (IRS) have been key vector control strategies in malaria control initiatives in Africa, including Tanzania. Due to long-term LLIN and IRS use, mosquitoes have evolved physiological and behavioral resilience to insecticides. Hence, residual malaria transmission has increased, endangering malaria elimination efforts. This study examines how mosquito-biting behavior changes could affect malaria epidemiology in Tanzania's South Eastern area.

METHODOLOGY

A mosquito electrocuting trap (MET) was used to gather Anopheles mosquitoes from November 2019 to September 2020 in the districts of Rufiji, Kilwa, and Kibiti. Samples were collected weekly (18:00 - 06:00) from 22 villages, with three houses per village sampled over three days.

For each house, two METs were employed; one trap was set inside the house and the other was positioned 15 meters away outside the house. Each trap included a volunteer.

Fig 1. MET set up in the study area and sample house used

RESULTS

A total of 3,586 *Anopheles* mosquitoes were collected, 1,912 (53.32%) *Anopheles gambiae*, 1,666 (46.46%) *Anopheles funestus*, 7 (0.2%) *Anopheles coustan*, and 1 (0.03%) *Anopheles pharoensis*.

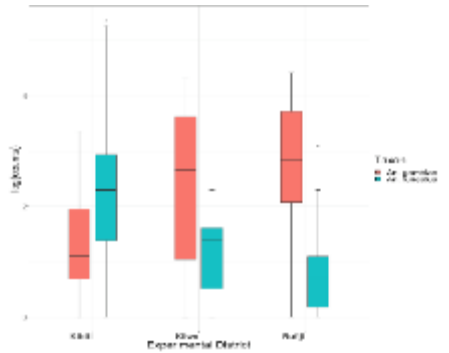

Fig 2. Species composition in the three district

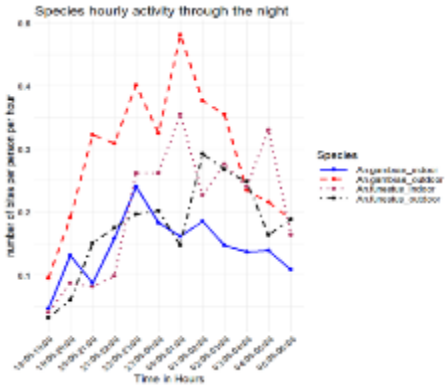

Fig 3. Hourly *Anopheles* biting behaviour

Anopheles gambiae exhibited a greater preference for outdoor biting, at a rate of 0.32 bites per person per hour during 20:00-21:00hr, increasing progressively through the night to reach a peak of 0.48 bites per person per hour during 00:00-01:00hr.

Ms. Janice Stephen Maige
Research Officer

BSc: Computer Science
MSc: Data Science - *Ongoing* (UDSM)

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Statistical modelling on methods used for malaria and mosquito control at the household level in Tanzania

Introduction

- Global Technical Strategy for Malaria 2016–2030 is to ensure universal coverage for all people at risk of malaria using effective vector control with either LLINs or other core prevention tools such as indoor residual spraying.

Main Objective

- Aimed to determine factors related to methods used for malaria and mosquito control at the household level in Tanzania.

Methodology

- A cross-sectional survey involving primary school pupils and random sample of households around the schools was interviewed on malaria prevention, treatment, and control methods.
- We applied a generalized linear model (**GLM**) for poisson regression
- It models the probability of methods (*y*) available within household for a specific timeframe, assuming that y occurrences are not affected by the timing of previous occurrences of y. This can be expressed mathematically using the following formula

$$P(y) = \frac{e^{-}\mu.t(\mu.t)^{y}}{y!} \quad where\, y = 0, 1, 2...$$

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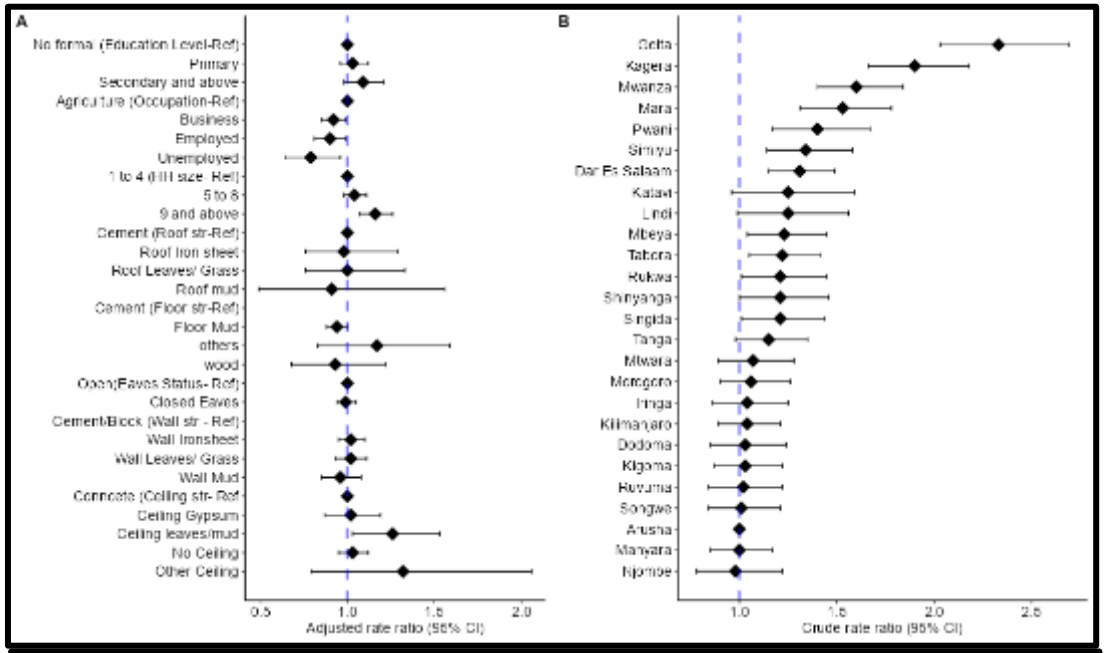
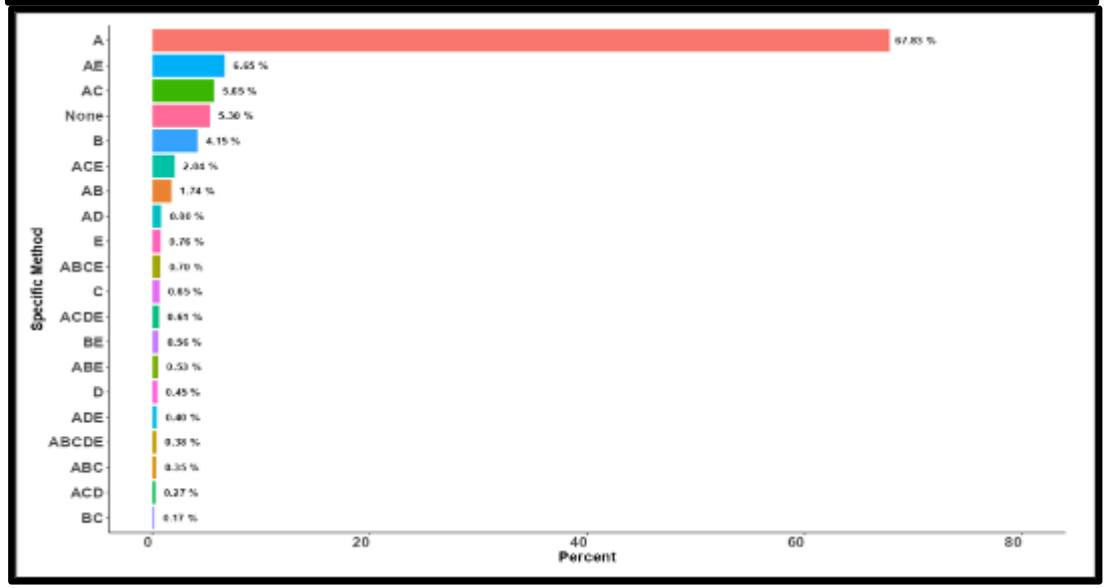
Key study findings……





John Mbaraka

Research Officer

BSc: Statistics(EASTC)

MSc: Statistics(UDSM, Student)

Integrating Intervention-Targetable Behaviours of malaria vectors to optimize Intervention selection and impact.

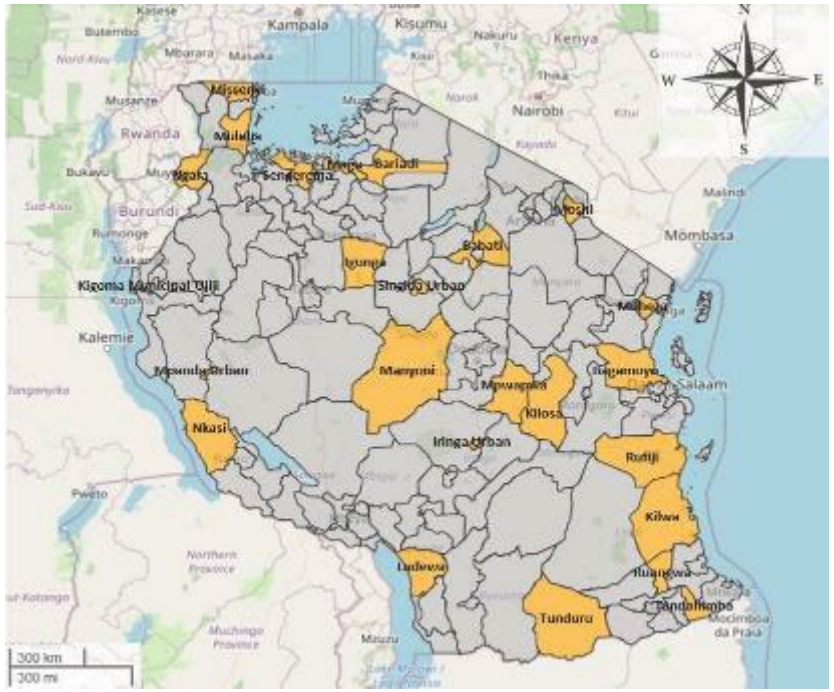
Praise John Michael
Research Officer

BSc: Applied Statistics
Mzumbe University

MSC INTEREST: DATA SCIENCE/ EPIDEMIOLOGY

INTRODUCTION

While insecticides-resistance is widely recognized to affect the effectiveness of ITNs, the most fundamental limitations of ITNs are**; behaviors of mosquitoes** and **humans** that allow vector populations to survive by feeding outdoors, feeding at times when people are active outside of their nets, and by feeding on animals



STUDY OBJECTIVES

- To assess how national-scale climatic variation impacts the host-seeking behaviours of malaria vectors
- To quantify the influence of geographic climatic variation upon the proportion of human exposure to bites occurring indoors and outdoors
- To characterize common human activities that increase exposure to malaria vectors
- To determine how climate-associated geographic variations in livestock ownership affect the host choice of malaria vectors
- To predict expected changes in mosquito behaviours in response to climate change to guide adaptive intervention strategies

METHODOLOGY

- The study has been implemented in a rolling cross-sectional surveillance of malaria mosquito and human behaviours across 25 districts in diverse ecological settings in mainland Tanzania from January 2020 to date.
- Households are sampled for mosquito collections and Human behaviours surveys (Questionnaires, Human activities observations, and FGDs) .
- Weather variables included: Temperature, Humidity, and windspeed
- Preliminary analyses are done by R programming and Stata

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Investigating factors associated with vectors densities, composition and biting pattern across different setting of Tanzania to Inform Control Strategies.

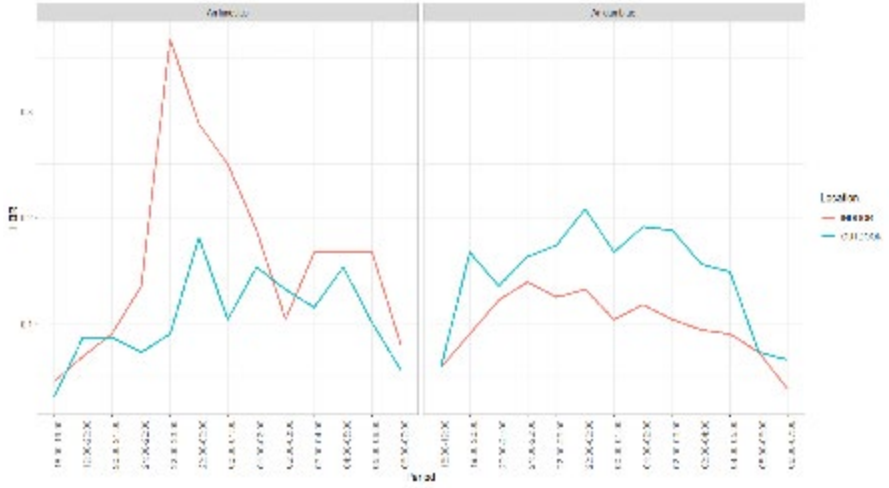
Motivation

- Major Malaria interventions, such as ITNs and IRS, are becoming less effective due to changes in mosquitoes behavior and insecticide resistance.
- In Tanzania's northern, western, and southern regions, where malaria still caused significant child mortality, complimentary approaches are still needed to address the problem.
- This study aims to determine malaria vectors species abundance, and investigate their biting patterns.

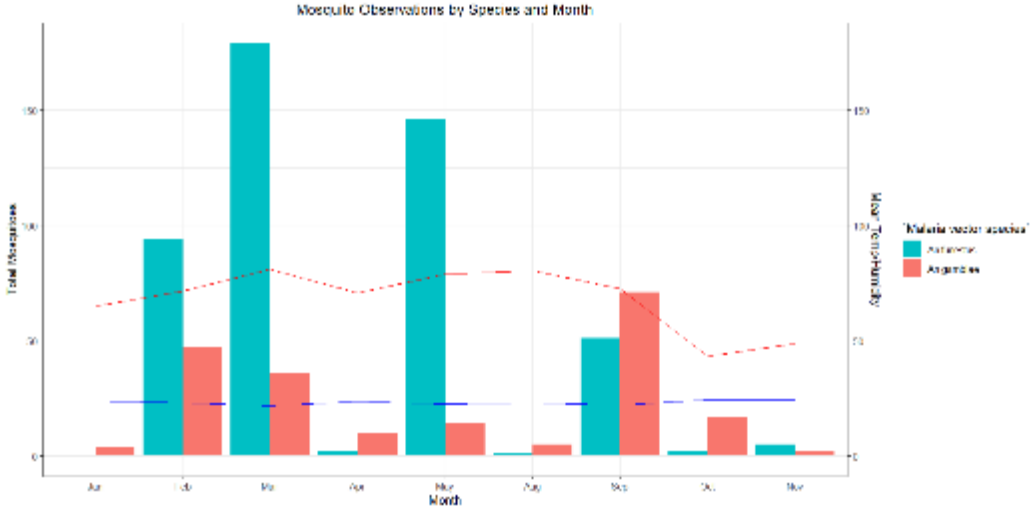
Study Objectives

1. To identify the species composition and relative abundance of malaria vectors in different districts of Tanzania.
2. To investigate the biting behaviors of the identified malaria vector species, including the time and location of their biting activity.
3. To assess the impact of housing conditions, agricultural practices, livestock rearing, and a house structure on Tanzania's distribution and abundance of malaria vector species

Biting Patterns, Time and Location



Mosquito Species abundance



Selemani Mmbaga
Data Scientist

B.E. Information System and Network Engineering
SJUIT

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Prediction of Malaria positivity rate using Machine Learning in Rufiji district: Time series analysis.

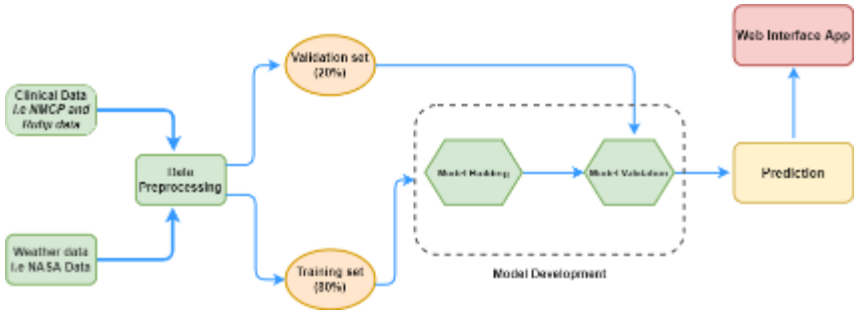
Introduction

➢Malaria is still a significant public health problem in Sub-Saharan Africa, including Tanzania.
➢While surveillance measures have been put in place, forecasting future outbreaks remains a significant challenge, impeding effective interventions. Machine learning techniques can be used to improve outbreak forecasting and target interventions.

Methodology

A study was conducted in Rufiji district in southeastern Tanzania. This study employed epidemiological data and climatic data from January 2016 to October 2021.

Work architecture



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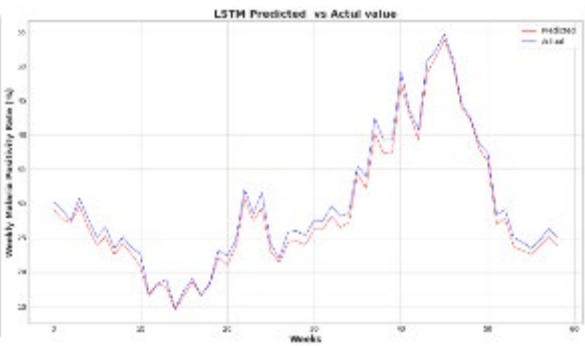
Study Objective

To use machine learning techniques to create accurate predictive models for malaria positivity rates in Rufiji, which will aid public health experts in developing effective malaria control strategies.

Results

Models	GRU	LSTM	XGBOOST
RMSE	0.51	1.2	1.39
R-square	0.99	0.98	0.97



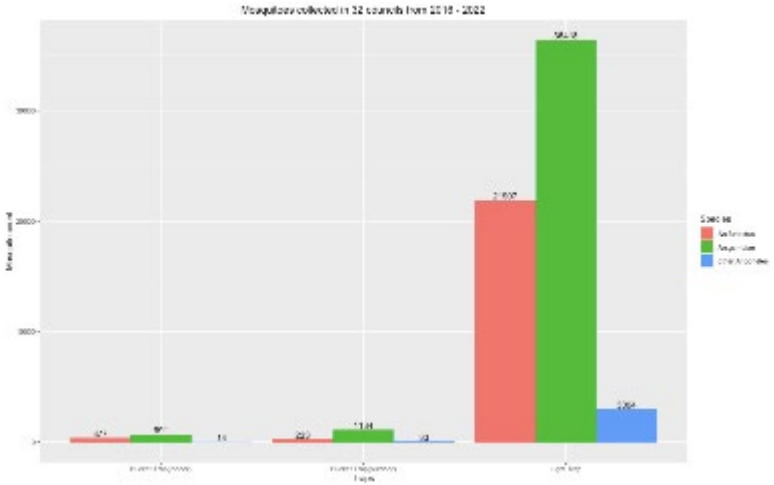
Tajiri Laizer
Research officer.

BSc: **Statistics , UDOM**
Areas of interest
Machine learning, Bio statistics & epidemiology

Malaria Vector Entomology serveillance data analysis.

BACKGROUND

- In 2016, Tanzania's NMCP established Longitudinal National Malaria Vector Entomological Surveillance (MVES) across 62 sentinel sites – now reduced to 32 districts due to budget constraints.
- MVES aimed at periodically assessing malaria vector species composition, their abundance and infectious status, time and place of biting, resting and host preference across different seasonality to guide deployment of appropriate vector control interventions to assess their performance over time.



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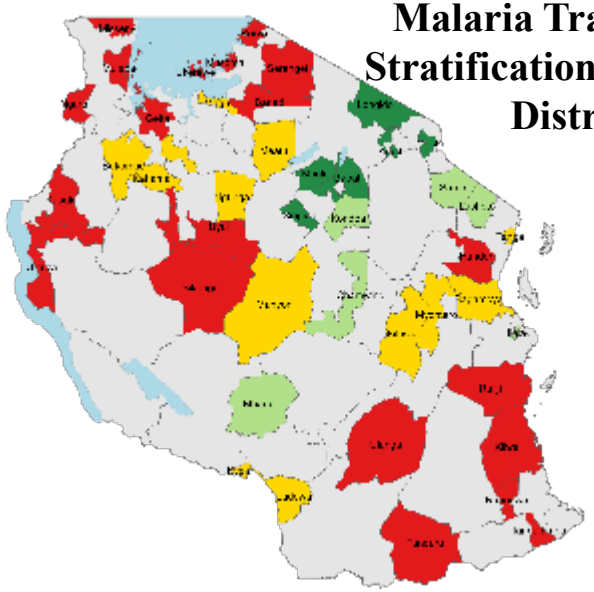
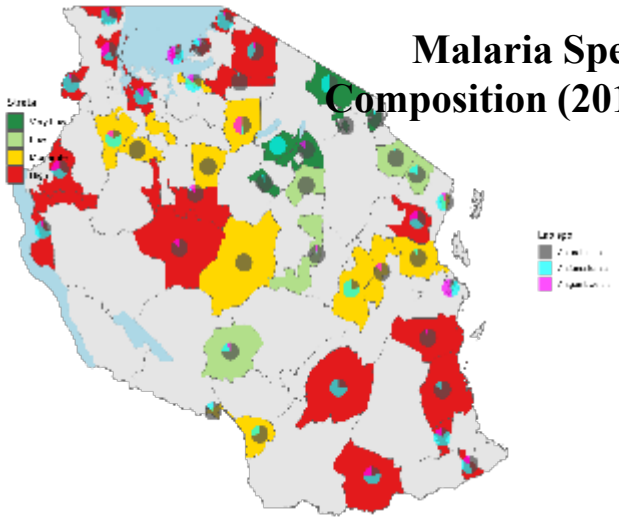
RESULTS

Malaria Transmission Stratification of Selected Districts



Malaria Specie Composition (2017-2021)



The findings on species compositions across different malaria transmission strata (i.e., very low, low, medium, and high) by laboratory identified species (i.e., Anopheles. gambiae s.s., An. arabiensis, An. funestus). The changes on malaria species over time has helped assess the impact of vector control interventions on different malaria vectors and their dominance over the last 6 years at different districts.

Brian Anthony Masanja
Research Officer

B.A Statistics - UDSM
Employment Position:
Research Officer

EXTENDING EFFORTS TOWARDS NCDs ELIMINATION

OUR SCOPE

- Capacity building towards grants application for Jakaya Kikwete Cardiac Institute (JKCI)
- Getting involved in research

ONGOING RESEARCHES

- Risk factors and outcome of STEMI patients in Tanzania
- Mapping Clustered and Stratified risk factors and outcome of coronary artery disease in Tanzania

Miss Neema Kailembo
Research Officer

B.A in Economics and Statistics – UDSM
Prospective Student
MSc in Health Economics and Decision Science
University College of London (UCL)

Mapping risk factors and outcome of coronary artery disease in Tanzania: Clustering and Stratification approach

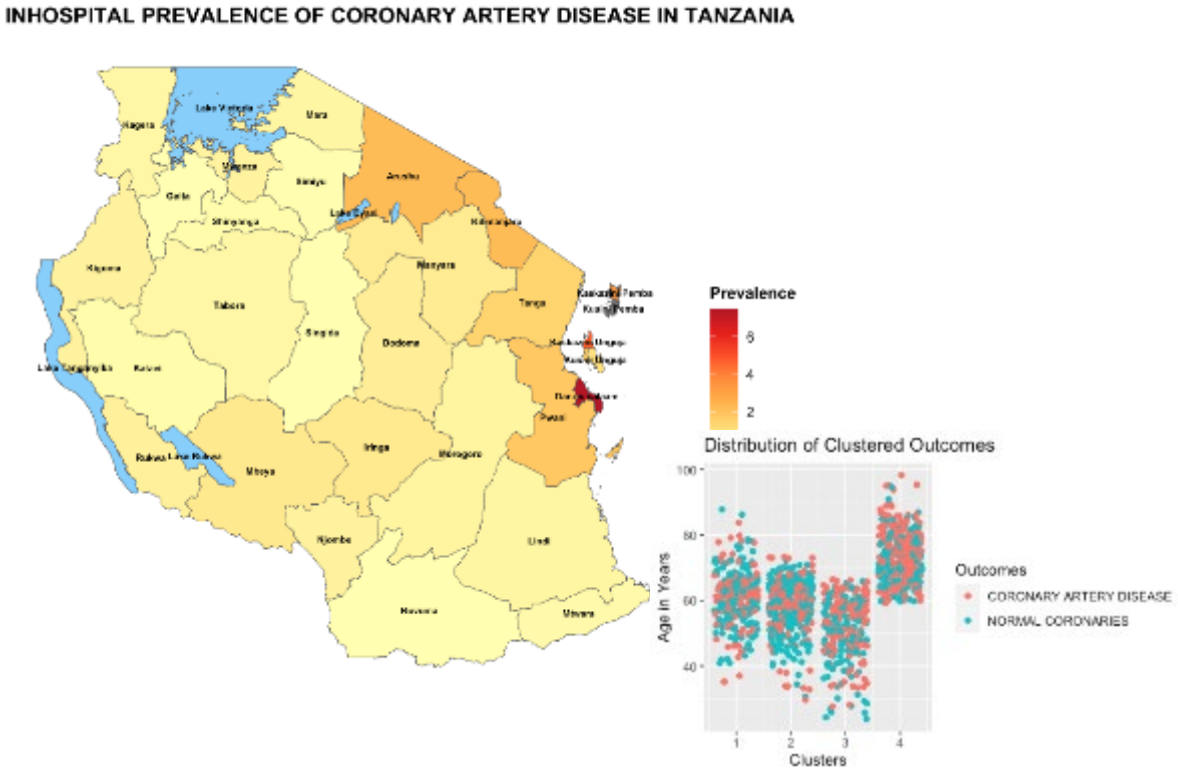
Motivation

- Coronary artery disease (CAD) burden is alarming, mainly in Low- and middle-income countries, with 75% of premature deaths and 164 million disability-adjusted life years (DALYs) despite several interventions.
- Tanzania has regions with variety of culture and traditions that affects modifiable risk factors differently
- Here a retrospective study is conducted to identify and evaluate the distribution of symptoms and risk factors of coronary artery disease in Tanzania to recommend appropriately tailored interventions

General Objective

Overall to Map the clustered and stratified risk factors of Coronary artery disease in Tanzania

Preliminary Results



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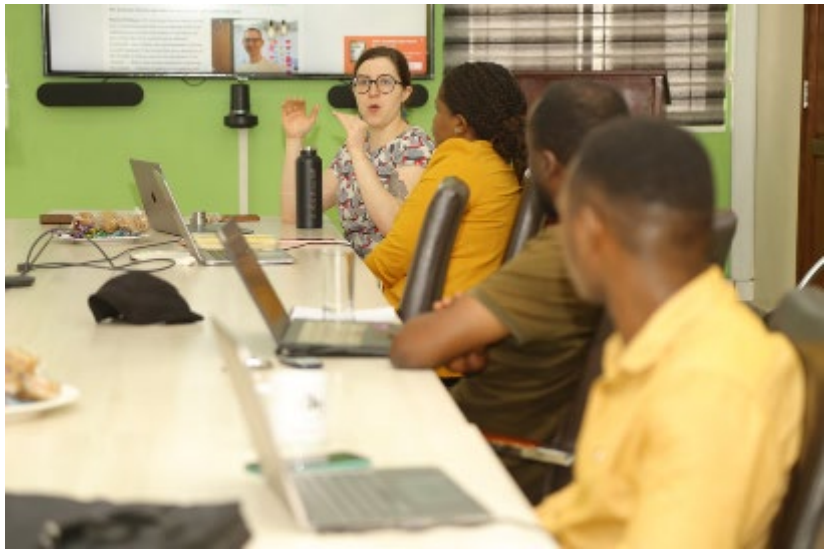
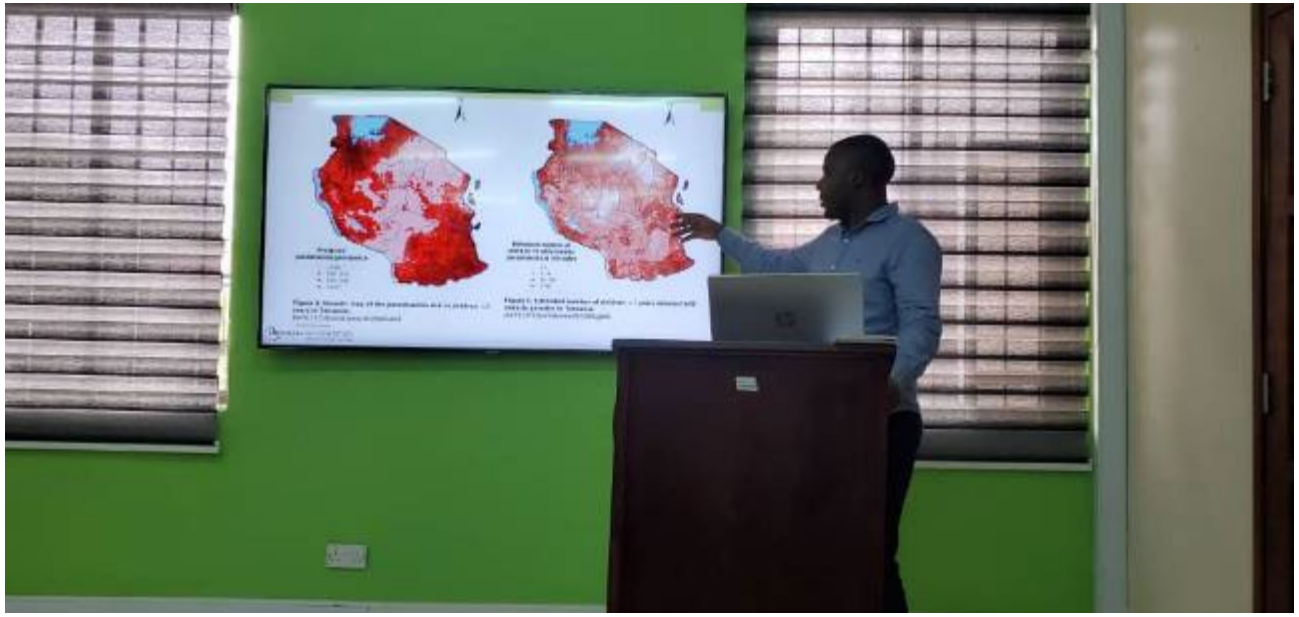
Short course: Spatial Data Visualization

- A One month program
- IHI, UDSM, NMCP - participants
- Enhancing Writing, presentation skills
- Dr. Amelia Bertozzi-Vila
- Collaborators are invited



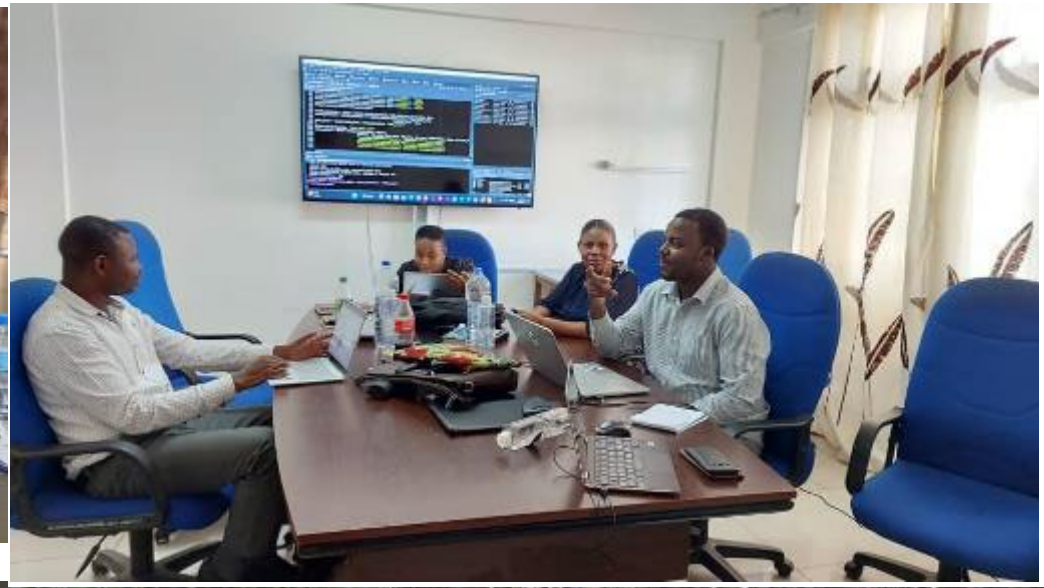


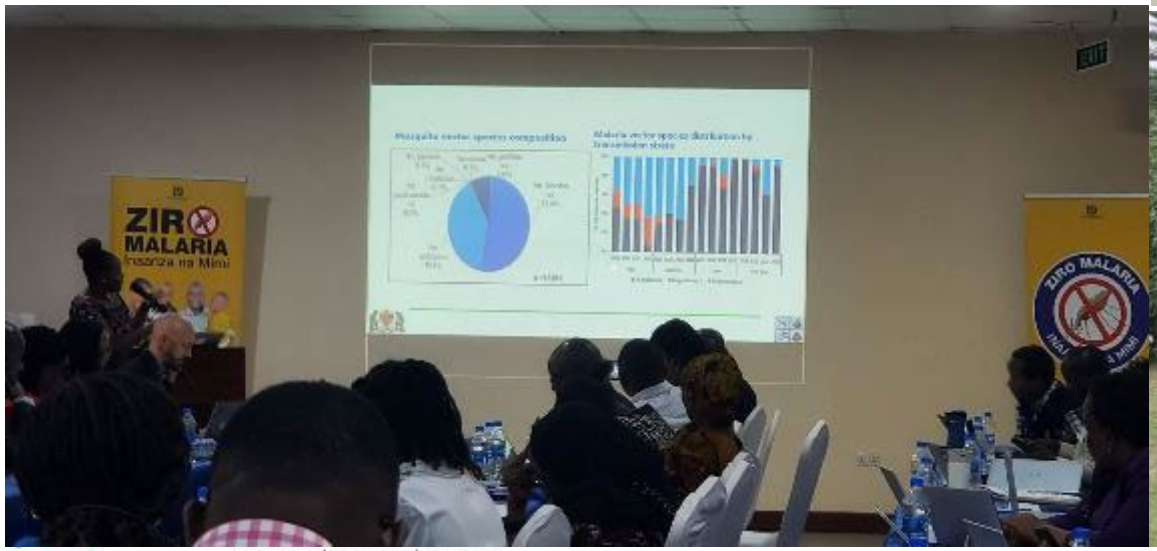
Strengthening Vector Control Decision Making in Africa - Workshop

A. All Participants and facilitators B. Women represented, C. Handling of certificates

Examples – selected projects
Supporting National Malaria Control Programs

Data Analysis support and training - NMCP





RESEARCH Open Access

Stakeholder perspectives on a door-to-door intervention to increase community engagement for malaria elimination in Zanzibar

Faiza Abbas[1,2*], April Monroe[3], Samson Kiware[4,7], Mwinyi Khamis[1], Naomi Serbantez[5], Abdul-Wahid Al- Mafazy[6], Fauzia Mohamed[2] and Emmanuel Kigadye[2]

Abstract

Background Malaria remains a major public health problem in sub-Saharan Africa. The 2021 World Health Organization (WHO) World Malaria Report indicates a slowing in the decline of malaria incidence since 2015. Malaria prevalence in Zanzibar has been maintained at less than 1% since 2010, however from 2018 to 2021, the annual number of reported malaria cases has gradually increased from 4106 to 9290. Community engagement has been emphasized by the WHO for reducing malaria transmission. To better understand the potential for a door-to-door approach for malaria, a three-month pilot programme was carried out. This qualitative study aimed at understanding stakeholder experiences with the pilot programme and considerations for its implementation.

Methods Through multistage sampling, four shehias (wards—the lowest administrative structure) with comparatively high (> 1.9 per 1000) and four with low (< 1 per 1000) incidence of local malaria cases were selected and involved in a door-to-door pilot intervention. The qualitative study was conducted after the pilot intervention and employed focus group discussions and in-depth interviews. All field notes were written on paper and audiotaped using digital audio-recorders. Summaries were developed by integrating field notes with reviews of recordings; themes were developed based on the topics identified a priori. Responses for each theme were summarized using an iterative process.

Results Most community members reported high levels of acceptance of door-to-door interventions. Some factors that might affect implementation of door-to-door include, low risk perception of the disease, local beliefs and practice, lack of initiative from the programme level to involve communities, and political instability during the election period. All Community Health Volunteers (CHVs) recommended this approach for community engagement, however, ensuring adequate resources was identified as a key factor for ensuring its sustainability.

Conclusion The door-to-door intervention was perceived as helpful for promoting community engagement. There are several factors to consider including ensuring that CHVs are provided with adequate education, regular supervision, and have access to essential resources. Community leaders should be fully involved in choosing CHVs that are acceptable to the community. To ensure sustainability, the government should allocate sufficient resources and improve coordination systems.

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RESEARCH Open Access

Socio-demographic trends in malaria knowledge and implications for behaviour change interventions in Zanzibar

Faiza Abbas[1,2*], Emmanuel Kigadye[2], Fauzia Mohamed[2], Mwinyi Khamis[1], John Mbaraka[3], Naomi Serbantez[4], Abdul-Wahid Al-Mafazy[5], April Monroe[6] and Samson Kiware[3,7]

Abstract

Background Zanzibar is among the few places within East Africa that have documented a significant reduction of malaria morbidity and mortality. Despite tremendous gains over the past decade, malaria transmission still persists in Zanzibar. This study aimed at understanding levels of malaria knowledge to provide recommendations that can be used to reinforce and scale up targeted malaria social and behaviour change interventions.

Methods A descriptive cross-sectional survey was conducted through an administered questionnaire to 431 households selected randomly. The interviewees were the heads of household or representative adults above 18 years. This study investigated the levels of knowledge about the causes, symptoms, and prevention of malaria in areas with high (> 1.9 per 1000) and low (< 1 per 1000) incidence of local malaria cases. The Principal Component Analysis (PCA) was used to compute the composite variable of each category. Descriptive statistics were calculated to understand variables of interest between low and high transmission areas. Multinomial logistic regression model was used to compare knowledge on malaria based on key variables.

Results A total of 431 heads of households were interviewed. Respondent age, education level, and wealth status were significantly associated with variations in level of malaria knowledge. Old age was found to be significantly associated with low knowledge of malaria ($P < 0.001$). The majority of study participants who had secondary and higher education levels had good knowledge of malaria ($P < 0.006$). Participants characterized as middle-income had good knowledge compared to those characterized as low-income ($P < 0.001$).

Conclusion The study identified existing gaps in malaria knowledge in low and high transmission areas. Low levels of malaria knowledge were documented among elderly and populations with lower education and income levels. There is a need to extend mobilization, advocacy, and expand channels of communication to reach all community members. The reported gaps in knowledge are important to consider when designing strategies to engage communities in malaria elimination in Zanzibar. Tailored social and behavioural change interventions aiming to increase malaria knowledge could enhance the uptake of malaria prevention services in the community.

Keywords Knowledge on malaria, Local malaria transmission, Incidence, Zanzibar, Tailored SBC, Intervention

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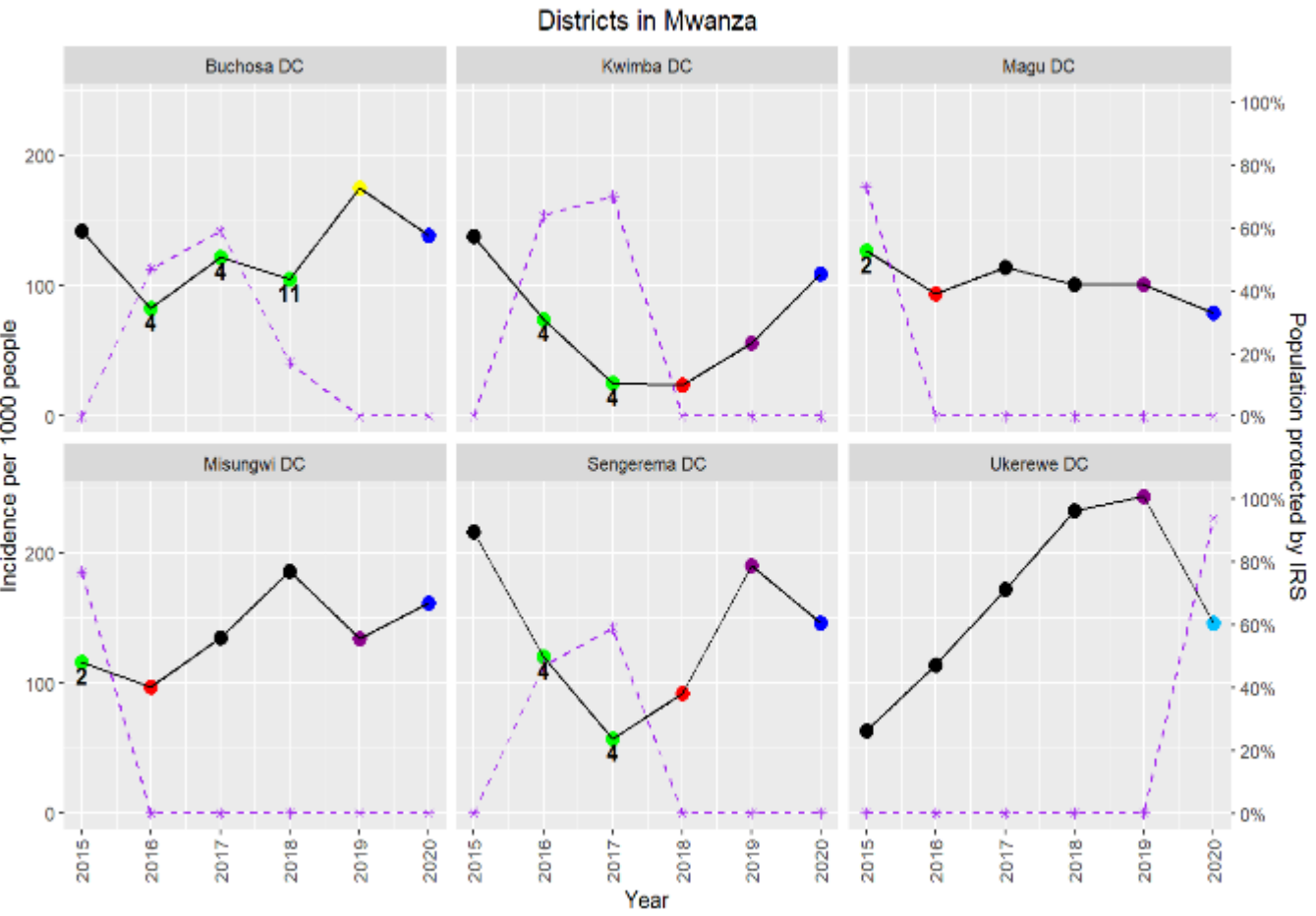
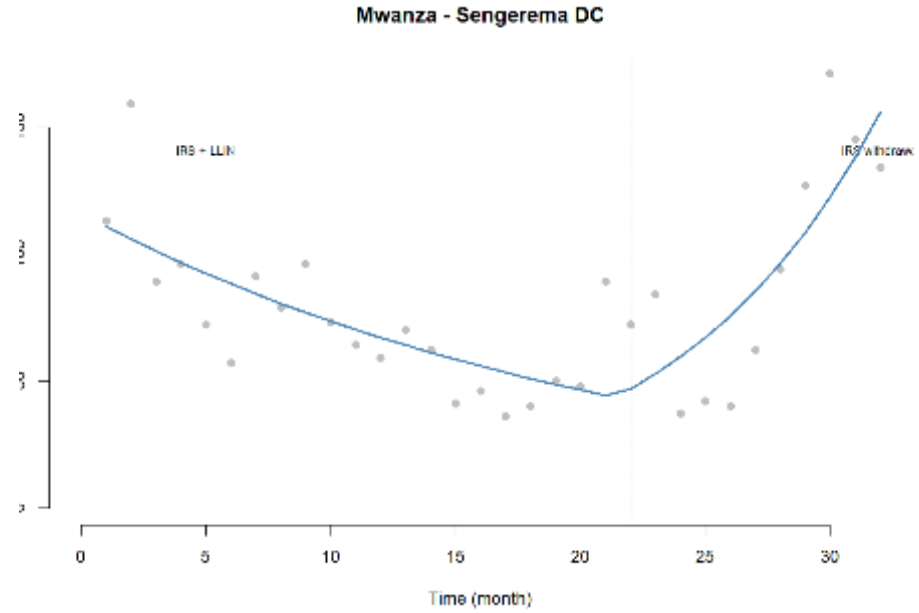
Impact of IRS withdrawal: Should Tanzania withdrawal its IRS program?





Partners involvement

Lead author: NMCP Head of Vector Control Unit

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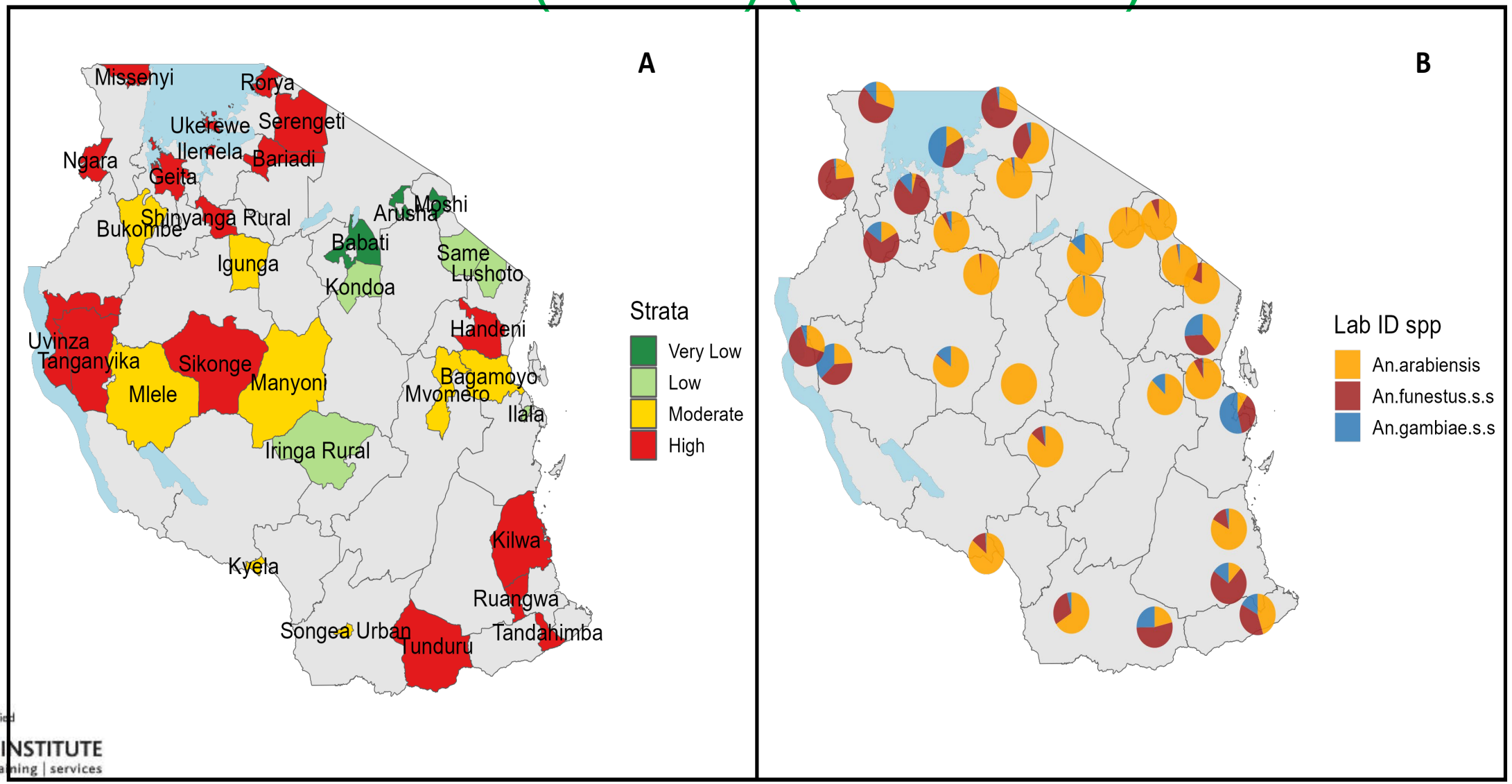
Longitudinal National Malaria Vector Entomological Surveillance (MVES) (2017-2022)



Acknowledgements

Team members

NMCPs

Local & International Collaborators