

# The combined use of Indoor Residual Spraying and Long-Lasting Insecticidal Nets for malaria reduction in endemic rural Tanzania: A cross sectional entomological survey dataset

## DOI

10.17037/DATA.14

## Data Creators

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## Data Description

Research outputs produced through repeated cross sectional entomological surveys in rural Tanzania for the purpose of evaluating the combined impact of Long-Lasting Insecticidal Nets (LLIN) and Indoor Residual Spraying on malaria transmission, in comparison to sole use of LLIN. Information collected includes: total mosquitoes collected inside the household, details of house structure (type of wall and roof, presence of open eaves, ceiling and window screens), presence of livestock, whether the house was sprayed, as well as bed net ownership and usage. Information on *Anopheles* species and sporozoite rates is also provided.

## Research objectives

Muleba in Tanzania is an area that was holoendemic for *Plasmodium falciparum* malaria prior to the application of indoor Residual Spraying (IRS). Between 2007 and 2010, Research Triangle Institute (RTI) conducted a pyrethroid spray round every 12 months; which contribute significantly to malaria prevalence reduction in the area. The aim of the study was to determine whether it is necessary to continue performing IRS once malaria transmission has been reduced or whether following the scaling-up of LLINs the IRS can be withdrawn and low transmission rates can be maintained equally well with LLINs alone.

## Data Collection Methods

Data collection took place within a two-arm cluster-randomised intervention trial. A series of 19 monthly entomological cross sectional surveys (seven in the baseline and twelve in the intervention year) were undertaken in 20 randomly selected clusters in each arm. From April 2011, mosquito density was monitored using CDC light traps during one night on a monthly basis in eight randomly selected houses from each cluster. After obtaining informed consent from the family, a light trap was installed at the foot of a bed occupied by a family member sleeping under a treated or untreated bed net. Information was collected on house structure (type of wall and roof, presence of open eaves, ceiling and window screens), presence of livestock inside or outside the house, whether the house was sprayed, and bed net ownership and usage. Houses were randomly sub-sampled from the list of houses that had been sampled for the preceding cross-sectional household survey. Mosquito collections were identified to species using a simplified morphological key adapted from Gillies and Coetzee, and subsequently tested by ELISA for detection of *Plasmodium falciparum* circumsporozoite protein (Pf-CSP). A sub-sample of *An.gambiae* s.l. was tested using Real time PCR Taq Man assay to distinguish between the two sibling species *An.gambiae* s.s. and *An.arabiensis*.

The quality and coverage of IRS was investigated using the carbamate Insecticide Quantification Kit in the intervention year (IQKTM [Innovative Vector Control Consortium, www.ivcc.com]). Wall scrapings of prescribed area were taken from the living rooms and bedrooms of 368 households in April 2012 and 490 household in June 2012, respectively

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four months after the first spraying and one month after the second spraying. The concentration of bendiocarb residue on the wall was assessed by a colorimetric assay which reacts to the presence of insecticide.

Household data were collected using Pendragon Forms (Pendragon Corporation Software, Libertyville, USA) on Personal Digital Assistants (PDA) and analysed using STATATM (STATAcorp, Texas, USA, version 11.2). Mosquito data were collected on paper form, and double-entered into a Microsoft Access database.

### Data Analysis and Preparation

An identifier for each houses was created which include round, cluster and household identification number to uniquely identify each house round collection. Each variable have been checked for range, value and missing data and cleaned. Outside range or value were re-coded as missing value. String variables were transformed in numerical variables and coded. Mosquito level data were aggregated at household level and merged to the household databases. Minimum and maximum latitude, longitude and altitude ranges for each village were created.

The Entomological Inoculation Rate per month was calculated as the product of sporozoite rate and *An.gambiae* s.l. collected in the light trap for each house for each month. Baseline vector density was categorised, into low density clusters, mean *An.gambiae* s.l.  $\leq 1$  per household per night, and high density clusters mean *An.gambiae* s.l.  $>1$  per household per night, to investigate interactions. *Anopheles* and Culex density ratios and EIR incidence rate ratios between the intervention and control arms were estimated using negative binomial regression adjusting for baseline low and high *Anopheles* density. Logistic regression was used to estimate sporozoite odds ratios. Standard errors were adjusted to allow for within cluster correlation of responses using robust standard errors (svy command in STATA).

### Geographic regions

Kagera Region, Tanzania

### Key dates

Data collection took place between January 2011 - December 2013.

### Quality Controls

Paper forms have numbered and coded items to ensure straightforward and accurate data entry and processing. Quality control on paper forms and PDA was done by checking for missing data and completeness and internal consistency of responses. Electronic questionnaire had built in checks for missing data, implausible responses and internal consistency.

All quantitative data collected on paper forms were double-entered into a Microsoft Access database independently by two data clerks. Validation to resolve any discrepancies in the data was performed by data manager.

### Species:

Human population, mosquitoes

### Privacy:

GPS co-ordinates of each household have been removed and replaced with village co-ordinates ranges.

### Ethics

The trial was approved by the ethics review committees of the Kilimanjaro Christian Medical College, the National Institute for Medical Research Tanzania and the London School of Hygiene and Tropical Medicine (application no. 5814). The trial is registered with ClinicalTrials.gov (registration number NCT01697852).

### Keywords

Anopheles, Long-Lasting Insecticidal Nets, LLIN, Indoor Residual Spraying, IRS, malaria, cluster-randomised intervention trial

## Language of written material

English

## Project Title

The combined use of indoor residual spraying (IRS) and long-lasting insecticidal nets (LLINs) for malaria reduction in endemic rural Tanzania

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- President Malaria Initiative (PMI)
- US AID

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- ClinicalTrials.gov ID: NCT01697852
- Grant Number: ITDCVP54

## Associated Roles

Role	Forename	Surname	Faculty / Dept	Institution
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<b>Project Researcher Leader,</b>	Mark	Rowland	Faculty of Infectious and Tropical Diseases / Dept of Disease Control	London School of Hygiene & Tropical Medicine
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<b>Project Researcher member,</b>	W.N.	Kisinja		National Institute for Medical Research, Amani Medical Research Centre, Muheza

## Additional Information

See 'Muleba\_study\_documentation.pdf' for additional information on the study.

## File Description

Title	Filename	File type	Description
<b>Household baseline dataset</b>	HH_Muleba_entomo_baseline_2013.csv	Comma Separated Values	Results of baseline survey. Contains 2313 records and 70 variables.
<b>Household post intervention dataset</b>	HH_Muleba_entomo_post_2013.csv	Comma Separated Values	Results of post intervention survey. Contains 4192 records and 71 variables.
<b>Mosquito baseline dataset</b>	Mosquito_Muleba_entomo_baseline_2013.csv	Comma Separated Values	Mosquito information collected in baseline survey. Contains 5862 records and 14 variables.
<b>Mosquito post intervention dataset</b>	Mosquito_Muleba_entomo_post_2013.csv	Comma Separated Values	Mosquito information collected in post intervention survey. Contains 4054 records and 14 variables.
<b>Dataset documentation</b>	Dataset_documentation.pdf	Adobe PDF/A	Documentation for the 4 CSV files
<b>Household baseline codebook</b>	HH_Muleba_entomo_baseline_2013_codebook.txt	ASCII Text	Codebook for the baseline survey results
<b>Household post intervention codebook</b>	HH_Muleba_entomo_post_2013_codebook.txt	ASCII Text	Codebook for the post intervention survey results
<b>Mosquito baseline codebook</b>	Mosquito_Muleba_entomo_baseline_2013_codebook.txt	ASCII Text	Codebook for the baseline survey mosquito information
<b>Mosquito post intervention codebook</b>	Mosquito_Muleba_entomo_post_2013_codebook.txt	ASCII Text	Codebook for the post intervention survey mosquito information
<b>Capsule Beem Form</b>	Mosquito_Muleba_storage_form.pdf	Adobe PDF 1.4	Storage form used in the study
<b>Mosquito trapping informed consent agreement</b>	Muleba_entomo_consent_form.pdf	Adobe PDF 1.4	Informed consent form used in the study
<b>Malaria Prevention Trial: Muleba Entomology Questionnaire</b>	Muleba_HH_questionnaire.pdf	Adobe PDF 1.4	Questionnaire used for data collection in the study
<b>Study documentation</b>	Muleba_study_documentation.pdf	Adobe PDF 1.4	A description of the study context