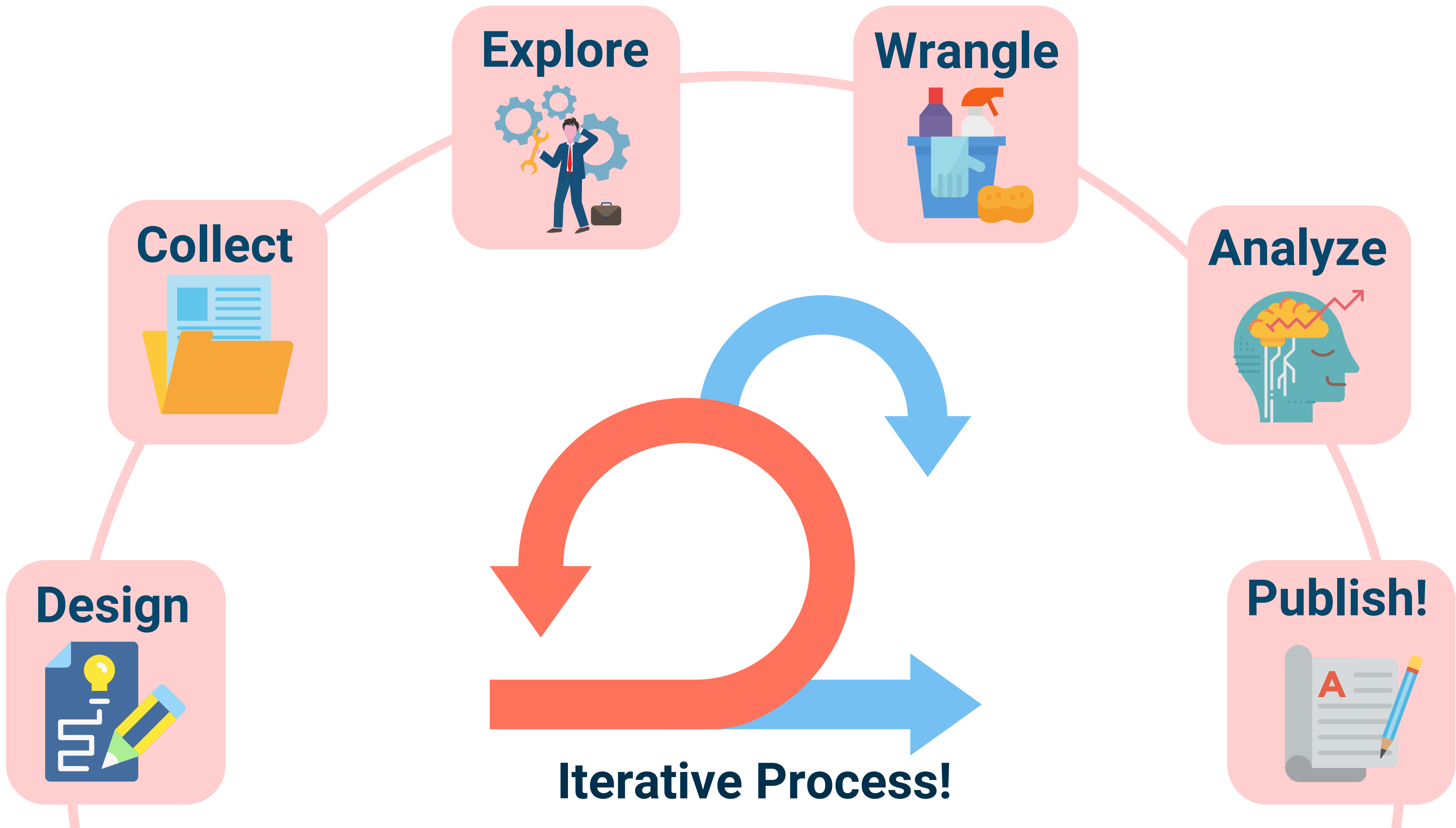


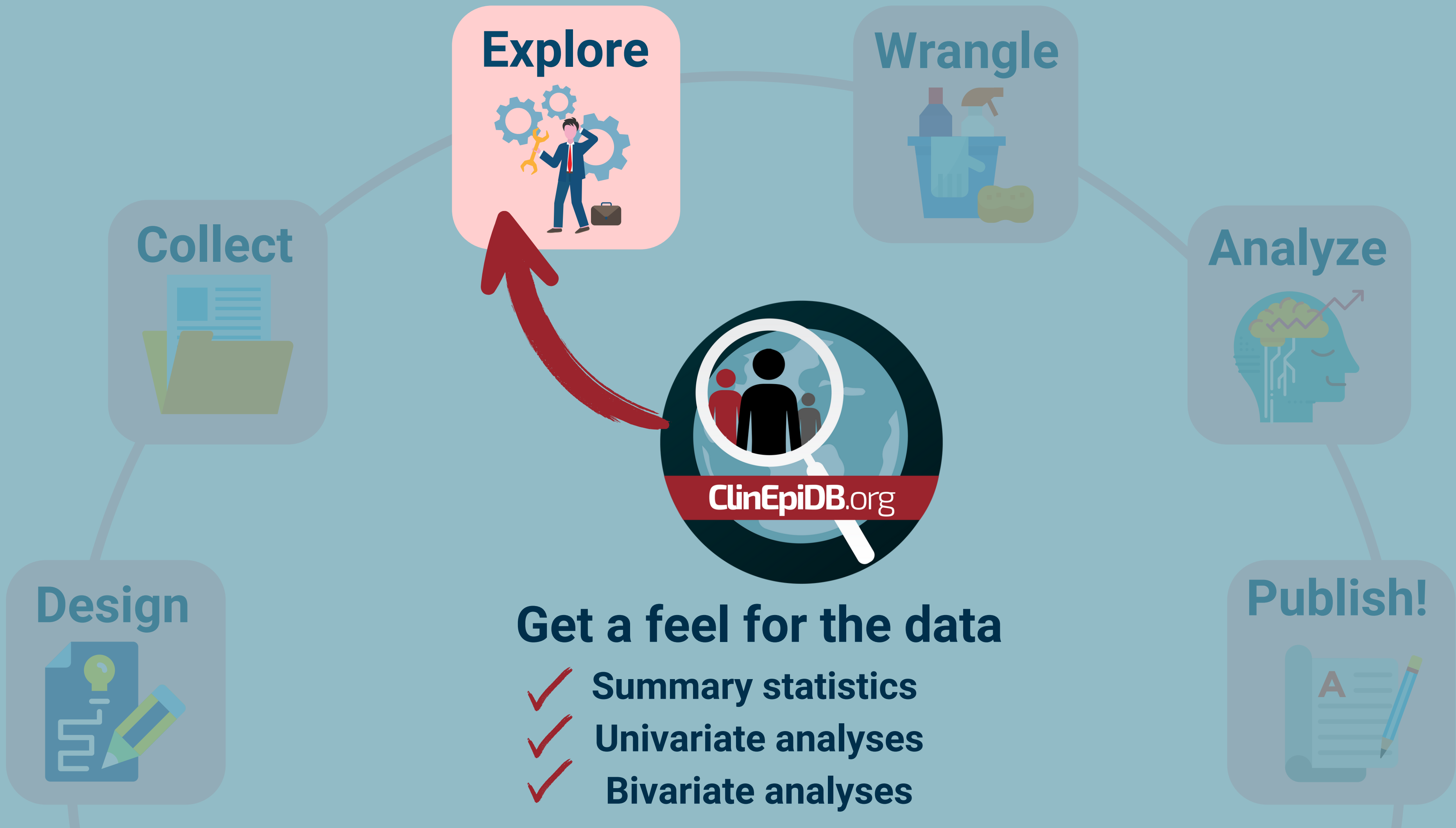


Exploratory Data Analyses.

Hypothesis-driven
explorations







Exploratory Data Analysis

Understand the variables

- Determine what data was collected
- Pinpoint important variables & identify useless variables to leave behind

Find issues with the data

- Outliers, missing values, skewed distributions, *etc*

Explore potential relationships between variables

- Discover potential patterns, spot anomalies, check assumptions
- Summary statistics & graphical representations



Collect



Explore



Wrangle



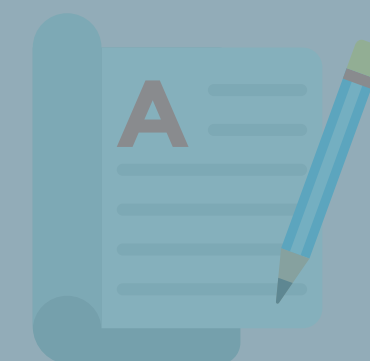
Analyze



Design



Publish!



- ~~Robust statistics~~
- ~~Modelling~~
- ~~Machine Learning~~
- ~~Publication-quality graphs~~



Effect of long-lasting insecticidal nets with and without piperonyl butoxide on malaria indicators in Uganda (LLINEUP): a pragmatic, cluster-randomised trial embedded in a national LLIN distribution campaign



Sarah G Staedke, Samuel Gonahasa, Grant Dorsey, Moses R Kamya, Catherine Maiteki-Sebuguzi, Amy Lynd, Agaba Katureebe, Mary Kyohere, Peter Mutungi, Simon P Kigozi, Jimmy Opigo, Janet Hemingway, Martin J Donnelly

Summary

Background Long-lasting insecticidal nets (LLINs) are the primary malaria prevention tool, but their effectiveness is threatened by pyrethroid resistance. We embedded a pragmatic cluster-randomised trial into Uganda's national LLIN campaign to compare conventional LLINs with those containing piperonyl butoxide (PBO), a synergist that can partially restore pyrethroid susceptibility in mosquito vectors.

Methods 104 health sub-districts, from 48 districts in Uganda, were randomly assigned to LLINs with PBO (PermaNet 3.0 and Olyset Plus) and conventional LLINs (PermaNet 2.0 and Olyset Net) by proportionate randomisation using an iterative process. At baseline 6, 12, and 18 months after LLIN distribution, cross-sectional surveys were done in 50 randomly selected households per cluster (5200 per survey); a subset of ten households per cluster (1040 per survey) were randomly selected for entomological surveys. The primary outcome was parasite prevalence by microscopy in children aged 2–10 years, assessed in the as-treated registered with ISRCTN, ISRCTN17516395.

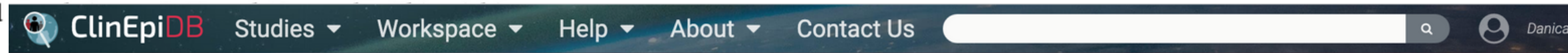


Ugandan MoH 2017-2018 UCC (Universal Coverage Campaign) provided one LLIN for every two people in each household

Lancet 2020; 395: 1292–303

See [Comment](#) page 1236

Department of Clinical Research, London School of Hygiene & Tropical Medicine, London, UK (Prof S G Staedke PhD); Infectious Diseases Research Collaboration, Kampala, Uganda (Prof S G Staedke, S Gonahasa MBChB, Prof Moses R Kamya PhD, Catherine Maiteki-Sebuguzi MSc, Agaba Katureebe MSc, ...)



LLINEUP Cluster Randomized Trial

[+ New Analysis](#) [My Analyses](#)

Unnamed Analysis



[View Study Details](#) [Browse and Subset](#) [Visualize](#) [Download](#) [Record Notes](#)

Primary publication: [Effect of long-lasting insecticidal nets with and without piperonyl butoxide on malaria indicators in Uganda \(LLINEUP\): a pragmatic, cluster-randomised trial embedded in a national LLIN distribution campaign. Staedke et al. Lancet 2020 04 18;395\(10232\):1292-1303](#)

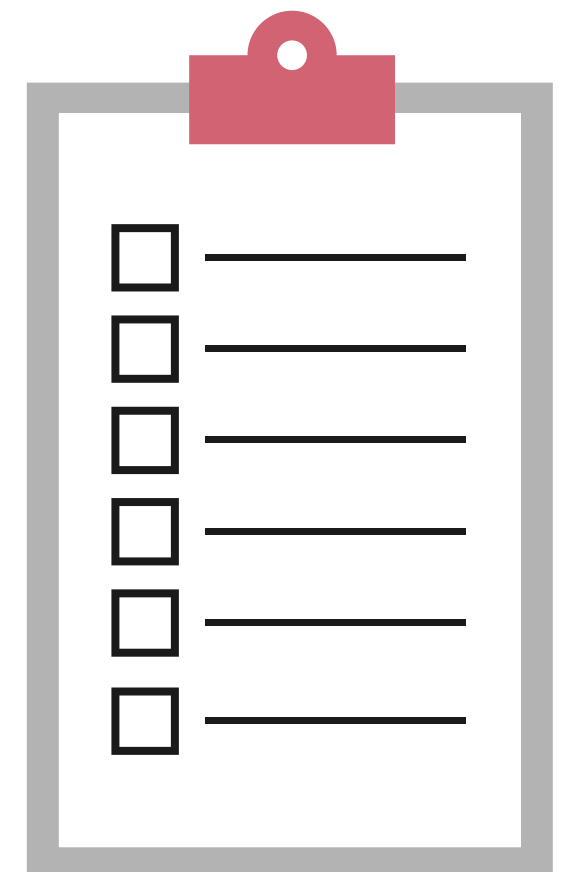
Primary contact: Sarah Staedke, London School of Hygiene and Tropical Medicine, London, United Kingdom

Release # / date: ClinEpiDB rel. 21, 2022-MAR-03

Summary: The LLIN Evaluation in Uganda Project (LLINEUP), a pragmatic cluster-randomized trial embedded in the 2017-2018 long-lasting insecticidal net (LLIN) national distribution campaign, evaluated the effect of LLINs with and without piperonyl butoxide on malaria indicators in 104 health sub-districts (clusters) in Eastern and Western Uganda. Cross-sectional community surveys were conducted at baseline and at 6, 12, 18, and 25 months following LLIN distribution in ~50 randomly selected households per cluster; all children aged 2-10 years from enrolled households were assessed for malaria parasites, and a subset of 5-10 households per cluster were randomly selected for entomology surveys. To assess net integrity and chemical composition, 100 of each LLIN net type were withdrawn and replaced from selected households enrolled in the community surveys after 12 and 25 months.

LLINEUP Background

- In Uganda, long-lasting insecticide treated bednets (LLINs) are the primary intervention for malaria.
- Uganda has achieved near universal coverage, however LLINs have NOT had the desired impact on malaria burden in Uganda.
- High levels of pyrethroid resistance in malaria vectors may be contributing to the limited impact of LLINs.
- Piperonyl butoxide (PBO) is a synergist that can partially restore pyrethroid susceptibility in mosquito vectors.



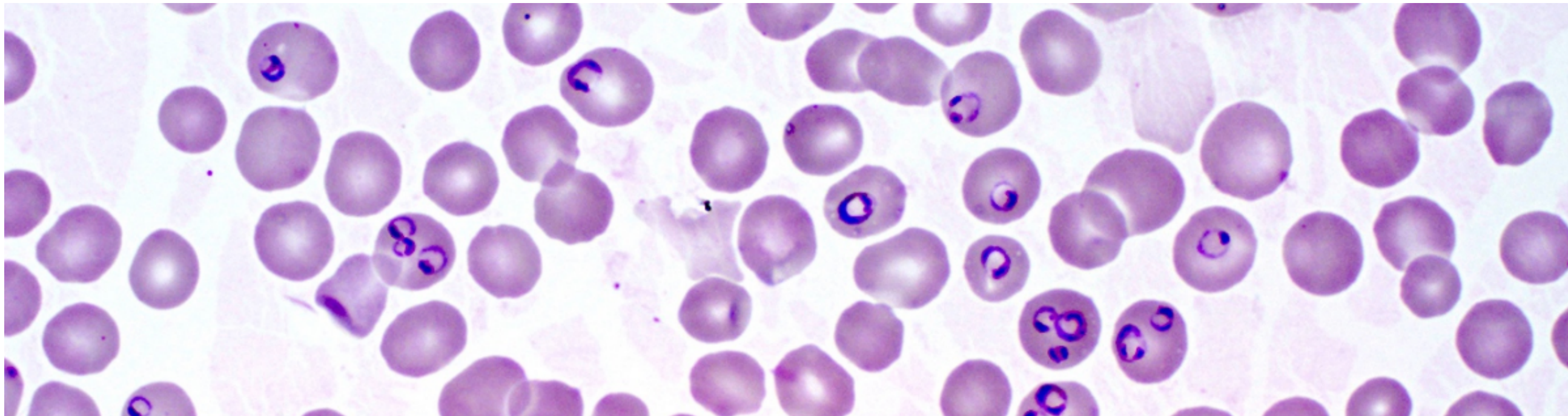
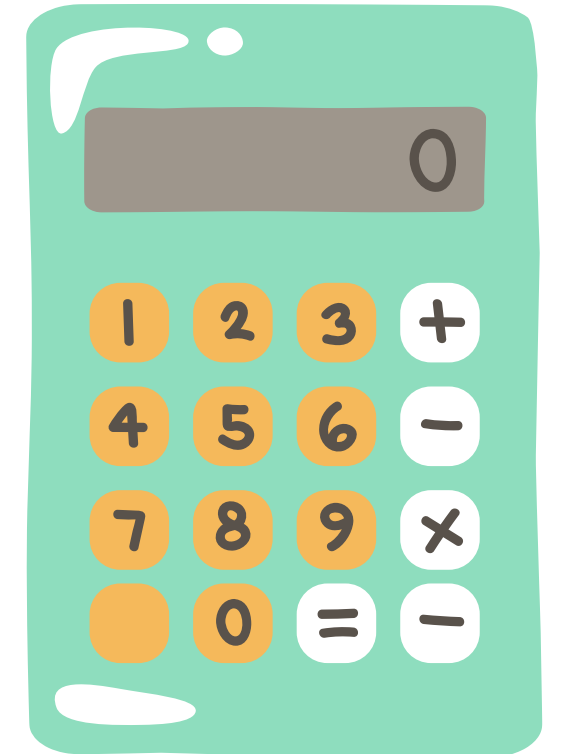
LLINEUP Study Design

- 104 clusters were enrolled
- Clusters were randomly assigned to receive conventional (non-PBO) LLINs or PBO LLINs through the Ugandan MoH UCC
- **Aim:** compare conventional (non-PBO) LLINs to PBO LLINs
- **Hypothesis:** PBO LLINs will reduce *Plasmodium* prevalence more effectively than conventional (non-PBO) LLINs



Plasmodium Prevalence

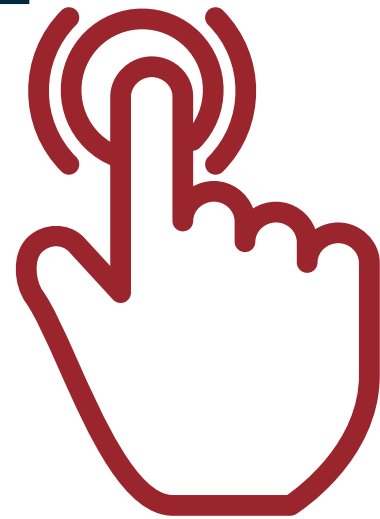
$$\text{Prevalence} = \frac{\text{\# of } \textit{Plasmodium}\text{-positive people}}{\text{Total \# of people tested for } \textit{Plasmodium}}$$



Demonstration outline

Hypothesis: PBO LLINs will reduce Plasmodium prevalence more effectively than conventional (non-PBO) LLINs

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Hypothesis-based exploratory analysis:

- Exploring data
- Applying filters to subset data of interest
- Visualizing data
- Adding notes to explain the analysis
- Sharing the analysis with others