

Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
- A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- A description of all covariates tested
- A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
Give P values as exact values whenever suitable.
- For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection Data collection on housing condition and modifications are collected using questionnaire survey and thermal imaging camera . No other computer code nor software is used.

Data analysis For double vulnerability analysis of heat stress and malaria transmission , we used Principal Component Analysis (PCA), which is described in the methodology section.For indoor environmental Computational Fluid Dynamics (CFD) simulations, we used OpenFOAM, an open-source CFD software.Data analysis was done in Python

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. Git-Hub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

Data available: Yes

Availability of Data and Materials: The data that support the findings of this study are available from the corresponding author on reasonable request.

Types of Data to be Shared: Thermal infrared data from field measurement, Meteorological data indoors, and Survey data for health risks.

Timing of Data Availability: Data will be available starting 6 months after publication and will be available for 2 years.

Data Request Process: Data will be available upon contact to Prof. Dr. Ronita Bardhan rb867@cam.ac.uk.

Human research participants

Policy information about [studies involving human research participants and Sex and Gender in Research](#).

Reporting on sex and gender	Among the total 138 patients included, 72 (52.2%) were female.
Population characteristics	We investigated 138 residents living in thirty houses, whose ages ranged from 4 months to 88 years old, with a mean age of 52 years old. The number of occupants per house varied between 1 and 10, with a mean value of 4.6 persons per house. The duration of residency in the houses spanned from 1 month to 56 years, with a mean duration of 14.3 years, influenced by rebuilding efforts from flooding or maintenance issues. A relatively small percentage, 13%, had lived in their current house for less than a year. The majority (97%) had been affected by malaria and an additional 33% had been affected by other diseases as well. As a proportion of individuals per household, 91% of members were affected.
Recruitment	The study enrolled participants from all 30 houses within the targeted area. Residents were approached and invited to participate in the study through a structured survey conducted by trained research assistants. Participation was voluntary, and individuals had the right to refuse or withdraw from the study at any time without consequences. This survey is conducted as a follow-up study, assessing entomological impact and community knowledge, perception and attitude of ease screening study for mosquito control.
Ethics oversight	Ethical clearance for this study was obtained from Kenya Medical Research Institute, Scientific Ethics Review Unit (KEMRI-SERU 4794), Kenya. The study protocol was reviewed and approved by researchers of KEMRI and University of Cambridge, ensuring the protection of participants' rights, confidentiality, and data privacy.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

Life sciences Behavioural & social sciences Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	Mixed-methods case study
Research sample	We investigated 138 residents living in 30 houses in the village of Korando B, Kisumu Kenya. The ages ranged from 4 months to 88 years old, with a mean age of 52 years old. The number of occupants per house varied between 1 and 10, with a mean value of 4.6 persons per house. The houses are randomly chosen to ensure a diverse representation of the local population forms across various occupant groups
Sampling strategy	The sample size of 138 residents within 30 houses allows for a meaningful analysis of house architectural layout, population characteristics, including sex and gender, age distribution, and household composition, which can inform broader conclusions about the village population.
Data collection	This research involved travel to the study site, collection of data. A risk assessment was completed and approved by the University of Cambridge. The study involved completing a questionnaire, collecting house data and obtaining photos/videos with iPhone and an infrared camera that omit personally identifiable features. Random selection ensured a diverse representation of the local population with varying ages.
Timing	Data collection was completed between 11th April - 14th April 2023.
Data exclusions	No data is excluded.
Non-participation	No participant drop out.
Randomization	Random sampling was done to allocate participants into experimental groups.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

- | n/a | Included in the study |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Antibodies |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Eukaryotic cell lines |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Palaeontology and archaeology |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Animals and other organisms |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Clinical data |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Dual use research of concern |

Methods

- | n/a | Included in the study |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> ChIP-seq |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> Flow cytometry |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> MRI-based neuroimaging |