

## 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
<input type="checkbox"/>	<input checked="" type="checkbox"/> The exact sample size ( $n$ ) for each experimental group/condition, given as a discrete number and unit of measurement
<input type="checkbox"/>	<input checked="" type="checkbox"/> A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
<input checked="" type="checkbox"/>	<input type="checkbox"/> The statistical test(s) used AND whether they are one- or two-sided <i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i>
<input checked="" type="checkbox"/>	<input type="checkbox"/> A description of all covariates tested
<input type="checkbox"/>	<input checked="" type="checkbox"/> A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
<input type="checkbox"/>	<input checked="" type="checkbox"/> 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)
<input checked="" type="checkbox"/>	<input type="checkbox"/> For null hypothesis testing, the test statistic (e.g. $F$ , $t$ , $r$ ) with confidence intervals, effect sizes, degrees of freedom and $P$ value noted <i>Give <math>P</math> values as exact values whenever suitable.</i>
<input checked="" type="checkbox"/>	<input type="checkbox"/> For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
<input checked="" type="checkbox"/>	<input type="checkbox"/> For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
<input checked="" type="checkbox"/>	<input type="checkbox"/> 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	No software was used to collect the data. This is a modelling analysis of data already collected and published.
Data analysis	Data analysis (modelling of infection and morbidity at baseline and trends under ivermectin treatment ) was performed using the individual-based, stochastic transmission model EPIONCHO-IBM, published in Hamley et al. (2019) PLoS Negl Trop Dis 13: e0007557. The model code and full documentation are hosted and maintained at: <a href="https://github.com/mrc-ide/EPIONCHO.IBM">https://github.com/mrc-ide/EPIONCHO.IBM</a>

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. GitHub). 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](#)

All data used in the study are presented in the papers cited. For onchocerciasis skin disease at baseline, the raw data used are from from Murdoch et al. (2017) PLoS Negl. Trop. Dis. 11: e0005489 and available in the Supplementary file S1 of this publication (<https://doi.org/10.1371/journal.pntd.0005489.s001>).

## Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	We do not report results by sex. For onchocerciasis ocular disease, Little et al. (2004) J. Infect. Dis. 189, 1932–1941, found no evidence of statistically significant differences between males and females in blindness incidence.
Reporting on race, ethnicity, or other socially relevant groupings	We do not report results by race or ethnicity (information not available in the papers used), but we clearly state the country and location for each study. All the countries are located in sub-Saharan Africa, and all the sites are onchocerciasis-endemic communities.
Population characteristics	We report results by age group following the age categories presented in the papers cited. For the estimation of annual biting rates we used infection prevalence in those aged 1 or 5 years and older according to the information provided in the papers.
Recruitment	The various studies used in our analysis had recruited individuals according to population stratification in each location.
Ethics oversight	All studies cited include details of ethical approval from their respective ethical review boards.

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](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

## Life sciences study design

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

Sample size	Sample sizes have been provided for all studies included in this paper (Methods section).
Data exclusions	No data exclusions were introduced in our analysis. Some studies examined the population aged 5 years and older while other studies examined the population aged 1 year and older. We have provided a full description of this in the Methods section for each study.
Replication	For each of the analyses presented, 1000 model runs (model repeats) were used to calculate the mean and 95% uncertainty intervals (Methods section and Figure captions).
Randomization	n/a
Blinding	n/a

## 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	Involved 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 type="checkbox"/>	<input checked="" type="checkbox"/> Clinical data
<input checked="" type="checkbox"/>	<input type="checkbox"/> Dual use research of concern
<input checked="" type="checkbox"/>	<input type="checkbox"/> Plants

### Methods

n/a	Involved 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

## Clinical data

Policy information about [clinical studies](#)

All manuscripts should comply with the ICMJE [guidelines for publication of clinical research](#) and a completed [CONSORT checklist](#) must be included with all submissions.

Clinical trial registration	We used published clinical data on onchocerciasis skin and ocular disease, but the original studies were not clinical trials.
Study protocol	For each study we describe the methods used by the authors and state the criteria used for identifying blind individuals (Methods).
Data collection	For each study we describe the methods used for data collection (e.g. questionnaire, clinical examination, skin biopsy) (Methods).
Outcomes	For each study we describe the outcomes (onchocerciasis skin and ocular disease classification) used in the modelling.

## Plants

Seed stocks	n/a
Novel plant genotypes	n/a
Authentication	n/a