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Reporting Summary

Nature Research 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 Research 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	Social opinion survey data was obtained from Afrobarometer. The ERA5-Land data (E5L) were selected as data are available for our period of interest (1988-2018) and for the fine spatial resolution of 9 km that facilitates a more precise alignment with the point-scale nature of the Afrobarometer data. Country-level extreme events were obtained from EM-DAT – the international disaster database
Data analysis	All statistical analysis was conducted with Stata version 13.1. All code used for climate analysis is available on request from the authors

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 Research 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 list of figures that have associated raw data
- A description of any restrictions on data availability

The datasets analysed during the current study are available in the Afrobarometer repository, and freely available from https://www.afrobarometer.org/data.
ERA5-Land hourly data from 1981 to present available from: https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-land?tab=overview.
EM-DAT – the international disaster database, is freely available at https://www.emdat.be/.

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	All data was quantitative. Individual survey responses are from the Afrobarometer, which provides the geo-location of each primary sampling unit (PSU). Each PSU contains eight interviews. Each country has between 150 and 300 numerating Areas (EAs) depending on sample size (only South Africa diverges from this rule with four interviews per PSU). Relying on these location data, we then matched respondents to meteorological data, and analyzed the effect of both individual demographic characteristics and meteorological conditions on climate change literacy.
Research sample	Survey data was drawn from the Afrobarometer's Round 7 public opinion survey, which collected data between September 2016 and September 2018. Afrobarometer conducted 44,623 interviews face-to-face interviews completed in 33 countries in the language of the respondent's choice with nationally representative samples of 1,200 to 2,400 yielding country-level results with margins of error of +/-3 to +/-2 percentage points at a 95% confidence level. 50% of the respondents were women, and a majority of respondents were between 25 and 36 years old.
Sampling strategy	The Afrobarometer sample design is a clustered, stratified, multi-stage, area probability sample, first stratifying the sample according to the main sub-national unit of government (state, province, region, etc.) and then by urban or rural location. Additional information on sampling is available in Afrobarometer technical information reports. When reporting multi-country findings such as regional or Africa-wide averages, each country is weighted equally (rather than in proportion to population size).
Data collection	Not applicable, we did not collect the data. Afrobarometer uses in-country partner research consultants for data collection. For more information on how Afrobarometer conducts its surveys see: https://www.afrobarometer.org/surveys-and-methods
Timing	The Afrobarometer interviewed respondents between September, 2016 and September, 2018.
Data exclusions	Results fro Zimbabwe were excluded as the question on causes of climate change were not asked in Zimbabwe. In our supplemental materials, we replicate our analyses including the 1,200 respondents from Zimbabwe.
Non-participation	Not applicable as we did not conduct the survey we only analysed it.
Randomization	Respondents were not randomly assigned to experimental conditions in this study. In our main analyzes, we use a linear probability model, regressing climate change literacy first on only the socio-demographic characteristics and perceptions of changing weather to identify the socio-demographic and psychological determinants of climate change literacy. We then include the meteorological and EM-DAT disaster data in the regression, identifying their effects on climate change literacy. In order to adequately account for the clustering of respondents within their country units, we include random effects at the level of the country following the suggestion from Marquart-Pyatt et al. (2014). We use random effects rather than fixed effects due to the large number of cases within each country unit and because we include country level disaster data, following the advice of Clark and Linzer (2015). In the Supplemental Material, we present alternative specifications of the model, which include both alternative control variables. We additionally include a more in-depth discussion of the assumptions of our primary model, and conduct additional analyses using different modeling techniques as robustness checks for our main findings. These additional robustness checks confirm our findings in our primary analyses.

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
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Human research participants
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging