nature portfolio

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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	Custom code used in this study will be made available on GitHub upon publication of the manuscript.
Data analysis	Custom code used in this study will be made available on GitHub upon publication of the manuscript.

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

Raw DNA sequences from this study will be made available on NCBI under Bioproject PRJNA1066374 upon publication of the manuscript.

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	This item does not apply to this study because this study does not involve research on human populations.
Reporting on race, ethnicity, or other socially relevant groupings	This item does not apply to this study because this study does not involve research on human populations.
Population characteristics	This item does not apply to this study because this study does not involve research on human populations.
Recruitment	Participants in this study were volunteers from the Department of Energy, Environmental and Chemical Engineering at Washington University in St Louis. They were recruited to collect water samples from their residences.
Ethics oversight	The Washington University Human Research Protection Office reviewed this project and determined that it did not involve activities that are subject to Institutional Review Board (IRB) oversight.

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

Ecological, evolutionary & environmental sciences study design

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

Study description	This study examined the microbiome and resistome of drinking water samples collected by volunteers from their residences.
Research sample	The samples in this study were drinking water collected from bathtub faucets and kitchen sink faucets. We were interested in the premise plumbing microbiome because it represents the primary setting where drinking water quality is experienced by customers. To represent the premise plumbing environment, samples were collected after overnight stagnation.
Sampling strategy	This study examined drinking water microbiomes in different households on the city scale and no such data were available in literature. We made our best effort to recruit volunteers to collect samples from their residences and the sample size was mostly restrained by logistic challenges.
Data collection	Sample temperatures were recorded by volunteers on site using the sampling kits we provided. Other water chemistry data were measured in the laboratory. Sequencing libraries were prepared in Ling Lab and sequencing data were provided by the Genome Technology Access Center at the McDonnell Genome Institute and the Edison Family Center for Genome Sciences & Systems Biology at Washington University in St. Louis.
Timing and spatial scale	The first experiment examining daily water microbiome dynamics was conducted in October 2018 and October 2019. Each volunteer collected bathtub faucet water samples from their homes on seven consecutive days. The second experiment examining within-household water microbiome variations was conducted in June 2021. Each volunteer collected water samples from bathtub faucet and kitchen sink faucet in their homes on two consecutive days.
Data exclusions	No data were excluded from the analyses.
Reproducibility	Bathtub faucet water samples were collected on seven days and data were reproducible as revealed by high Pearson correlations between microbial community compositions collected on different days.
Randomization	This item does not apply to this study because this study is not a randomized controlled trial and does not involve research on human populations.
Blinding	This item does not apply to this study because this study is not a randomized controlled trial and does not involve research on human populations.

Did the study involve field work? ☒ Yes ☐ No

Field work, collection and transport

Field conditions	This item does not apply to this study because the sampling was conducted in built environments (households).
Location	Samples were collected from 11 households in St Louis, Missouri, USA.
Access & import/export	The Washington University Human Research Protection Office reviewed this project and determined that it did not involve activities that are subject to Institutional Review Board (IRB) oversight. The samples were transported to the laboratory by volunteers within two hours of collection.
Disturbance	The volunteers were aware of the time demands (e.g., time cost to collect and transport water samples) before implementing this study.

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
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

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

Plants

Seed stocks	This study does not involve plant material.
Novel plant genotypes	This study does not involve plant material.
Authentication	This study does not involve plant material.