

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 (<i>n</i>) 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 <i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i>
☒	☐ 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. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted <i>Give P values as exact values whenever suitable.</i>
☒	☐ 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 <i>d</i> , Pearson's <i>r</i>), 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	Datasets used as input data by the study were downloaded from public data repositories of the datasets, which are listed in the references section of the manuscript. No software was used for data collection.
Data analysis	Scripts in Python and PHP were used to pre-process input data. They are available at http://github.com/ITC-CRIB/city-regions . Minimum cumulative weighted distance and catchment delineation code in Go is available at https://github.com/ITC-CRIB/globetrotter . Final data cleaning and analysis was done in Microsoft Excel (commercial). All maps were made in QGIS 3.22 and R.

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](#)

The input data used for the analysis can be found in the following references in the Supplementary Information file: 1,3-6.

All resulting data in output from our approach is published on Zenodo and is publicly available at:
<https://zenodo.org/records/11187634>

Human research participants

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

Reporting on sex and gender	No human research participants were involved
Population characteristics	n/a
Recruitment	n/a
Ethics oversight	n/a

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	We identify for all land-based locations at 30 arc-seconds resolution (approximately 1 km at the Equator), the centre of reference by urban tier category and the associated travel time. This is done by building on the approach of Weiss et al. (2020) and Nelson et al. (2019), which estimates the time required to reach each grid cell of the world's surface. Drawing on this dataset and providing a new approach to determine access to multiple urban centres of reference, we then combine it with the Global Human Settlement Layer – Population (GHS-POP) to allocate population to individual pixels and determine how many people have access to multiple urban tiers within a given travel time (see Methods). The approach is tested using also three alternative population datasets: WorldPop, LandScan, and GPW.
Research sample	We undertake a global mapping exercise using existing, publicly available, global gridded datasets at 30 arc-seconds resolution. Our sample is given by all pixels in these datasets. The rationale of the sample was to include all land-based locations, thus the sample is exhaustive of all relevant locations and fully representative. Information on the datasets used as inputs can be found above in the Data section.
Sampling strategy	This study did not require a sampling strategy since the rationale was to include all land-based locations, thus the sample is exhaustive. The size of the sample is 219 million grid cells. One area where we used different "samples" was to test the robustness of the results provided in the manuscript (based on GHS-POP). This was done by using alternative global gridded population datasets (WorldPop, LandScan, and GPW), which were similarly exhaustive but relied on different methods to downscale population to 30 arc-seconds resolution.
Data collection	All data used is secondary data and available in the public domain. See Data section for sources.
Timing	We use the existing datasets listed in the Data section. Population data used is for the year 2020.
Data exclusions	We did not exclude any data. All land-based locations are included.
Non-participation	Does not apply since we rely on secondary data that is based on a number of different primary data sources (remote sensing, population censuses, etc.).
Randomization	Our contribution on a technical level is to provide a new algorithm and apply it to existing data on all land-based locations in the world. Since the sample is exhaustive of all locations, there is no randomization possible.

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

Methods

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