

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	No software was used for data collection.
Data analysis	All statistical analyses were performed using R software version 4.4.1. Geographic mapping was performed using QGIS version 3.44. The R code used for the data analysis can be found on GitHub (https://github.com/xiaodieYao/MASLD-prevalence) and Zenodo (https://doi.org/10.5281/zenodo.21439664).

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 aggregated data supporting the findings of this study are provided in the Source Data files accompanying this paper. The de-identified individual-level participant data and data dictionary supporting the findings of this study have been deposited in the OMIX database at the National Genomics Data Center under

controlled access (accession number: OMIX017418; <https://ngdc.cncb.ac.cn/omix/release/OMIX017418>). Requests for access may be submitted either through the OMIX platform or directly to the corresponding author at zhengmh@wmu.edu.cn. A response will be provided within four weeks.

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	Sex (male/female) was collected as part of the study data. Disaggregated data by sex are provided in the manuscript/figures/tables with exact sample sizes for each subgroup. No gender-related data were collected.
Reporting on race, ethnicity, or other socially relevant groupings	Ethnicity was collected using the standardized data collection form, which included five predefined categories: non-Hispanic White, non-Hispanic Black, Hispanic, Asian, and others. Subgroup analyses were conducted by demographic characteristics and exposure variables of interest, including age (6–11 years or 12–18 years), sex (male or female), ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, Asian, or others), weight status (normal weight or below, overweight, or obesity), serum glucose levels (normal or elevated), serum ALT levels (normal or elevated), serum AST levels (normal or elevated), and continents (Asia, North America, or South America). Variables selected a priori, such as age, sex, ethnicity, weight status, serum glucose level, serum ALT level, and serum AST level, were included in regression models.
Population characteristics	A total of 9352 children aged 6–18 were included in the study, comprising 5785 participants from community-based populations and 3567 participants from hospital-based populations. Among 9352 children and adolescents, 9147 (97.8%) had valid CAP values, of whom 2970 (32.5%) were classified as MASLD cases. The median age was 12.0 years (IQR: 8.5–15.1), and 5471 (58.5%) were male.
Recruitment	This international multicenter cohort study included 9804 participants with VCTE data collected retrospectively from 38 centers across 17 countries on five continents (Supplementary Table 3). Data were collected from participating centers using predefined inclusion and exclusion criteria and a standardized data collection form completed by each participating center.
Ethics oversight	The study protocol was approved by the Ethics Committee of the Affiliated Children's Hospital of Jiangnan University (WXCH2024-02-062) and the institutional review boards of all participating centers (Supplementary Table 3).

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

Life sciences study design

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

Sample size	This retrospective cohort study included all eligible children aged 6–18 years who underwent VCTE at participating centers by August 2024, yielding a final sample size of 9352 participants.
Data exclusions	Initially, 9804 participants from multiple research centers were enrolled, and data were collected until August 2024 (Because the data from Africa were available only from Egypt and the sample size was small, Africa was not included). Participants were excluded if they were older than 18 years (n = 13), had missing VCTE results (n = 94), had missing or incorrect age data (n = 12), had fewer than 10 valid readings for controlled attenuation parameter (CAP) scores (n = 29), or had an interquartile range (IQR) of median liver stiffness measurement (LSM) values exceeding 30% (n = 36). Ultimately, the study included 9352 children aged 6–18, comprising 5785 participants from community-based populations and 3567 participants from hospital-based populations
Replication	This was a retrospective observational cohort study using historical clinical records. No experimental interventions were performed; therefore, replication of experimental findings is not applicable.
Randomization	It was not possible to use randomization in this observational study
Blinding	It was not possible to use blinding in this observational 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

Methods

n/a	Involvement in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

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

Plants

Seed stocks

n/a

Novel plant genotypes

n/a

Authentication

n/a