nature portfolio

Corresponding author(s): Anaïs Hasenböhler; Mathilde Touvier

Last updated by author(s): Nov 4, 2025

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	Data were collected online via the NutriNet-Santé web platform, which was developed using PHP with the Symfony framework and JavaScript. Data were initially stored in MariaDB and later migrated to Oracle.
Data analysis	All statistical analyses were conducted with R version 4.3.3, except for the restricted cubic spline method which was implemented with SAS version 9.4. The R and SAS code used in this study is provided in Supplementary Materials - R and SAS code for statistical analyses. R packages that were used were: survival (version 3.5-8), Hmisc (version 5.1-0), splines (4.3.3), and CMAverse (version 0.1.0)

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 raw data underlying this study are protected and are not available due to data privacy laws, since they are part of a running cohort with multiple ongoing

investigations and are subject to national and European regulations for the protection of individual sensitive health data. However, researchers from public institutions without financial conflict of interest can submit a request to have access to the data for strict reproducibility analysis (systematically accepted) or for a new collaboration, including information on the institution and a brief description of the project and sources of funding to collaboration@etude-nutrinet-sante.fr. All requests will be reviewed by the steering committee of the NutriNet-Santé study and an answer will be provided within 2 months. If the collaboration is accepted, a data access agreement will be necessary, and appropriate authorisations from the competent administrative authorities may be needed. The duration of data access is decided on a case by case basis depending on the complexity of analyses to be run. In accordance with existing regulations, no personal identifying data will be accessible. Typed-out data of tables and figures are provided with this paper.

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	The term "sex" is used throughout the study as we aim to reflect the biological attribute rather than the gender shaped by social and cultural circumstances. Results apply to both sexes (statistical models were adjusted for sex [based on self-report] and categories of exposure were defined using sex-specific cut-offs as shown in Supplementary Table 1. There was no specific hypothesis of an interaction between studied preservatives and sex, thus results are presented overall. However, all cut-offs for exposure categories were sex-specific (and presented by sex in Supplementary Table 6). Besides, all model analyses were adjusted for biological sex, which was self-declared.
Reporting on race, ethnicity, or other socially relevant groupings	Ethnic representation race/ethnicity and religion were not available in the cohort due to a very restrictive ethical/legal regulation policy regarding the collection of these data in French epidemiological studies (specific authorisations needed).
Population characteristics	The population for this study counts 108,723 participants, 79.2% women. Their mean age is 42.5 (SD=14.6). More detail is available in Table 1.
Recruitment	Participants aged 15 and above with access to the Internet are invited to participate in the study via a dedicated web-based platform (https://etudenutrinet-sante.fr/)
Ethics oversight	The study is registered at https://clinicaltrials.gov/ct2/show/NCT03335644 and is conducted according to the Declaration of Helsinki guidelines and approved by the Institutional Review Board of the French Institute for Health and Medical Research (IRB-Inserm) and the "Commission Nationale de l'Informatique et des Libertés" (CNIL n°908450/n°909216). Each participant provides an electronic informed consent form before enrolment.

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	N=108,723 participants; The data exclusion statement below explains how this sample size was chosen (no calculation performed). All eligible participants/cases of the cohort were included in the analyses. With a population study of 108,723 participants, 1131 incident cases, power of 80%, type I error rate = 5% and a proportion of exposed participants of 30% for instance for a given food additive preservatives, detectable HRs were 1.15 and 0.85.
Data exclusions	Participants with less than 2 valid 24-hour dietary records within the first two years of follow-up and those with prevalent type 1 or 2 diabetes were excluded
Replication	NA (observational cohort study)
Randomization	NA (observational cohort study)
Blinding	NA (observational cohort 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

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	https://clinicaltrials.gov/ct2/show/NCT03335644
Study protocol	https://info.etude-nutrinet-sante.fr/siteinfo/article/3
Data collection	Online, through the dedicated NutriNet-Santé website: www.etude-nutrinet-sante.fr
Outcomes	A multi-source approach was used to detect incident type 2 diabetes cases. Throughout follow-up, participants could report any health-related events, medical treatments, and examinations via the biannual health questionnaires every six months or, at any time, directly via the health interface of their profile. Besides, the NutriNet-Santé cohort was linked to the national health insurance system database to collect additional information regarding medical treatments and consultations, and to the French national mortality registry to identify the occurrence and cause of death. Biochemical assessment was not part of the type 2 diabetes case ascertainment. Further information is provided in Supplementary Method3.

Plants

Seed stocks	N/A
Novel plant genotypes	N/A
Authentication	N/A