

## 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 [Authors & Referees](#) 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

Infant feeding bottles sales data of Amazon sites worldwide were collected via Jungle Scout while the data of other e-commerce sites were collected through the sites.

Data analysis

The obtained data were analyzed by OriginPro 8.6.

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/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

All data analysed in this study is contained within the Supplementary Information. All the experiment details and data are available with the request.

## 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

# Behavioural & social sciences study design

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

Study description	Microplastics (MPs) have become a global concern due to their potential threat to human health. In this study, we focused on the potential exposure of infants to MPs due to the use of polypropylene infant feeding bottles (PP-IFBs). We found that PP-IFBs consistently release large quantities of MPs, with values as high as 16,200,000 particles/L. To estimate the potential global exposure to young infants we surveyed 48 countries and regions and found values ranging from 14,600 to 4,550,000 particles per capita per day, depending on the geographic location. Surface coating was found to be a promising method to reduce MP release.
Research sample	Microplastics (MPs) release from the infant feeding bottles (PP-IFBs).
Sampling strategy	We first developed a reliable sampling protocol to investigate MPs release from IFBs according to WHO guideline of formula preparation. Then we established the robust method to quantify and characterize the PP-MPs release from PP-IFBs, with the validation of independent third-party test. Based on world market sales data, the quantity, size and topography of MPs release from ten representative PP-IFBs products accounting for 68.8% of global market were then investigated. We also measured the influence of water temperature, sterilization and repeated use over 21-day period on the level of MP release. By combining the MP release data from PP-IFBs, with local non-breast-feeding rates and milk intake volumes we estimated the exposure of 12-month-old infants to MPs in 48 countries and regions. Finally, strategies to mitigate the risk of MP exposure were proposed and investigated.
Data collection	We developed a reliable protocol to quantify and characterize the PP-MPs release from PP-IFBs. Carefully following the user instructions for the IFBs, sample prepared and analyzed using Raman spectroscopy, AFM and SEM. we also investigated the latest IFBs sales details via local leading e-commerce site, with the aid of data mining software. To estimate the infants' exposure to MPs worldwide, we combined the quantity of PP released from different types of IFBs, the market share of PP-IFBs (data mining from leading e-commerce sites), non-breastfeeding rate (data from the Lancet and relevant government reports) and the daily milk intake volume of the babies (data from the instruction of the leading formula brands).
Timing	All the experimental data reported were collected between March to December 2019. The sales data were collected around June-August, 2019.
Data exclusions	No data were excluded.
Non-participation	Testing of each IFBs and accessory product involved five samples; The test protocol was independently validated by third party; A blank control sample was analyzed with every 10 PP-product samples to determine the background MPs concentration in DI water.
Randomization	We randomly purchased the PP-IFBs products from the market.

# 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	Involved in the study	n/a	Involved in the study
<input checked="" type="checkbox"/>	<input type="checkbox"/> Antibodies	<input checked="" type="checkbox"/>	<input type="checkbox"/> ChIP-seq
<input checked="" type="checkbox"/>	<input type="checkbox"/> Eukaryotic cell lines	<input checked="" type="checkbox"/>	<input type="checkbox"/> Flow cytometry
<input checked="" type="checkbox"/>	<input type="checkbox"/> Palaeontology	<input checked="" type="checkbox"/>	<input type="checkbox"/> MRI-based neuroimaging
<input checked="" type="checkbox"/>	<input type="checkbox"/> Animals and other organisms		
<input checked="" type="checkbox"/>	<input type="checkbox"/> Human research participants		
<input checked="" type="checkbox"/>	<input type="checkbox"/> Clinical data		