

A study detects plastic-related additives in 85% of 109 analysed food products

- The average intake values of the observed additives are below the limits recommended by the European health authority.
- The authors of the study, from IDAEA-CSIC, highlight the need to continue monitoring these substances in food and suggest implementing stricter measures for certain compounds.



Food products in plastic packaging / Canva

Barcelona, June 2, 2025. A study by the [Institute of Environmental Assessment and Water Research \(IDAEA-CSIC\)](#) has analysed the presence of plastic-related additives in food products representative of the Spanish diet. The aim of the study, published in the *Journal of Hazardous Materials*, was to estimate people's daily exposure to these compounds through food. The results show that 85% of the 109 analysed food samples contained at least one of these additives, although the average intake values found are below the limits recommended by the European health authority.

Agencies such as EFSA (European Food Safety Authority) and the USEPA (United States Environmental Protection Agency) have set maximum daily intake values for some of the compounds analysed—in particular, for 15 of the 20 plasticisers detected in the food samples. For these cases, the researchers conducted a risk assessment.

“We observed that, if we consider the average values found in food samples, the recommended thresholds are not exceeded in any case. However, if we consider high-exposure scenarios for infants and young children, those thresholds are exceeded for two compounds: the phthalate DEHP and the organophosphate EHDPP. For another

three compounds, the values are only ten times below the risk threshold,” explains IDAEA researcher **Julio Fernández Arribas**, first author of the study.

“Although current legislation is being met, it would be necessary to implement stricter regulations for those compounds whose harmful effects at certain doses are already known,” adds the study’s lead author and director of IDAEA, **Ethel Eljarrat**.

New plasticiser compounds

Several studies have demonstrated the toxicity of some plastic additives, such as organophosphate esters (used as flame retardants) and phthalates (used to make plastic more durable and flexible). In response to this evidence, the food industry has introduced new plasticisers, such as certain citrates and adipates, considered to be less toxic. However, recent studies show that some of these alternative compounds also cause long-term adverse health effects.

This study evaluated the concentrations of organophosphate esters, phthalates and alternative plasticisers simultaneously across different food categories (baby food, cereals, dairy, eggs, fish, meat, fruit and vegetables, legumes, sweets, oils and condiments). Food products were selected based on Spanish consumption patterns, according to data from the Ministry of Agriculture, Fisheries and Food, characterised by a high consumption of fresh food (around 40%) and a growing trend in packaged and ready-to-eat foods.

“We analysed a wide variety of products from different brands, both bulk and packaged, trying to cover the widest possible range of dietary exposure scenarios,” says **Fernández Arribas**. “The total levels of plasticisers averaged 61 nanograms per gram (ng/g), although levels up to 22 micrograms per gram (µg/g) were detected,” notes the researcher. European Union legislation does not establish a maximum level of plastic additives in food, but ensures food safety through regulation of materials intended to come into contact with food, setting migration limits for certain substances.

The study revealed that eight out of ten food products contained at least one plasticiser, with alternative plasticisers being the most frequently detected. According to **Eljarrat**, significant differences were observed depending on the type of packaging, suggesting that the material in contact with the food influences the presence of these compounds. “We were surprised by the concentrations of some plasticisers, such as acetyl tributyl citrate (ATBC), in glass containers, which may be due to the polymeric varnish layer on the metal lids of these products,” explains the researcher. A total of 20 different plasticisers were identified, with variations depending on the food category and brand.

The researchers also analysed ready-to-cook meals packaged in polypropylene containers. To assess the transfer of plasticisers during cooking in an oven or microwave, they conducted real-world tests, analysing the food before and after cooking. The results show that cooking processes can increase exposure to these compounds by up to 50 times. “Although the average levels detected remain below the migration limits set by the European Commission, as a precaution we recommend not heating food in this type of packaging,” adds **Eljarrat**.

Risk assessment

The researchers carried out exposure scenario assessments, calculating a total average daily intake of plasticisers of 288 nanograms per kilogram of body weight in adults, with

meat being the main source of exposure (59%), followed by cereals, legumes and sweets (20%).

The results indicate significantly higher daily intake levels in infants and young children due to their lower body weight and consumption of baby food. For infants, total average daily intake reaches 2262 nanograms per kilogram of body weight, and 1155 nanograms per kilogram in children aged one to three years. At these stages, in addition to baby food, meat is a major source of intake.

As previously mentioned, the average intake values found are below the recommended thresholds, although “in some cases, intake-related exposure values approach or exceed the risk threshold. It’s important to bear in mind that dietary intake is only one of several possible routes of exposure to these toxins, along with inhalation, dust ingestion or dermal contact,” **Eljarrat** points out.

With this study, the researchers underline the need to continue evaluating and monitoring plastic-related additives in food, particularly in the most vulnerable age groups.

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Fernández-Arribas, J., Moreno, T., & Eljarrat, E. (2025). **Plastic additives in the diet: Occurrence and dietary exposure in different population groups**. *Journal of Hazardous Materials*, 493, 138317. DOI: doi.org/10.1016/j.jhazmat.2025.138317

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