Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments

Phthalates in selected foods – April 1, 2011, to March 31, 2012

Food chemistry – Targeted surveys – Final report



Canada

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1400 Merivale Road
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Summary

Targeted surveys provide information on potential food hazards and enhance the Canadian Food Inspection Agency's (CFIA's) routine monitoring programs. These surveys provide evidence regarding the safety of the food supply, identify potential emerging hazards, and contribute new information and data to food categories where it may be limited or non-existent. They are often used by the agency to focus surveillance on potential areas of higher risk. Surveys can also help to identify trends and provide information about how industry complies with Canadian regulations.

Phthalates (also called plasticizers) are chemicals used to make plastics more flexible and harder to break. The major source of phthalate exposure is eating and drinking foods that have been in contact with plastic containers and/or foods containing phthalates. Exposure to phthalates is of concern, as studies have linked these substances to reduced reproductive health and development in animal studies. In people, increased levels of phthalates are associated with adverse health effects, for example obesity and reduced masculinization in newborn boys. For certain phthalates, food is thought to be the main exposure source. Increased phthalate levels in people were found to be associated with the consumption of fatty foods[1,2,3].

This targeted survey generated baseline surveillance data regarding phthalate levels in selected imported foods on the Canadian retail market. A total of 275 imported samples of different types of foods were collected and tested for the presence of 6 phthalates. Of these samples, 274 (99.6%) did not contain detectable levels of phthalates. The total phthalate level detected in the 1 positive sample was 1.5 parts per million (ppm).

There are no regulations in Canada for phthalate levels in food. All levels of phthalate found in the products tested in this survey were evaluated by Health Canada and deemed safe for consumption by Canadians.

What targeted surveys are

Targeted surveys are used by the CFIA to focus its surveillance activities on areas of highest health risk. The information gained from these surveys provides support for the allocation and prioritization of the agency's activities to areas of greater concern. Originally started as a project under the Food Safety Action Plan (FSAP), targeted surveys have been embedded in our regular surveillance activities since 2013. Targeted surveys are a valuable tool for generating information on certain hazards in foods, identifying, and characterizing new and emerging hazards, informing trend analysis, prompting, and refining health risk assessments, highlighting potential contamination issues, as well as assessing and promoting compliance with Canadian regulations.

Food safety is a shared responsibility. We work with federal, provincial, territorial, and municipal governments and provide regulatory oversight of the food industry to promote safe handling of foods throughout the food production chain. The food industry and retail sectors in Canada are responsible for the food they produce and sell, while individual consumers are responsible for the safe handling of the food they have in their possession.

Why the survey was conducted

Phthalates (also called plasticizers) are chemicals used to make plastics more flexible and harder to break. They are commonly used in PVC (polyvinyl chloride) plastics. They have a wide variety of industrial uses that include the manufacture of household and consumer goods such as lubricating oils, solvents, personal care products, and food packaging. Phthalates can migrate from plastic food packaging and from the gaskets of lids for glass containers into foods, particularly those foods that are oily or that have a high fat content. Phthalates can also migrate into food before it is packaged, while in contact with food contact materials during processing. Various foods have been identified as commodities which may have elevated levels of phthalates. The aim of this survey is to collect further data on these product types.

Exposure to phthalates is of concern, because these substances are linked to reduced reproductive health and development in animal studies. In people, increased levels of phthalates are associated with adverse health effects, for example obesity and reduced masculinization in newborn boys. Phthalates encompass a broad range of compounds. For certain phthalates, food is believed to be the main source of exposure. Increased phthalate levels in human blood and urine have been associated with the consumption of specific foods, especially fatty foods[1,2,3]. Bis(2-ethylhexyl) phthalate (DEHP) is the most commonly used and best-studied of the phthalates[2]. Recently, a dietary exposure assessment to DEHP, butyl benzyl phthalate (BBP), dibutylphthalate (DBP), and diisononyl phthalate (DINP) was carried out by the European Food Safety Authority (EFSA) where the concentration is expressed as DEHP equivalents[3]. In this survey, 6 phthalates were examined. They included BBP, DBP, di-N-octyl phthalate (DNOP), DEHP, DINP, and diisodecyl phthalate (DIDP). The phthalate concentration is reported as the sum of the concentrations of all phthalate forms observed.

The main objectives of this targeted survey were to generate baseline surveillance data on the level of phthalates in imported foods available on the Canadian retail market, and to compare the phthalate levels in foods in this survey with that of other targeted surveys and published studies in similar products.

What was sampled

A total of 275 imported foods were sampled between April 1, 2011, and March 31, 2012. Samples of products were collected from local/regional retail locations located in 11 major cities across Canada. These cities encompassed 4 Canadian geographical areas:

- Atlantic (Amherst, Halifax, Rothesay, and Saint John)
- Quebec (Montreal and Quebec City)
- Ontario (Ottawa and Toronto)
- West (Calgary, Kelowna, Saskatoon, Vancouver, and Winnipeg)

The number of samples collected from these cities was in proportion to the relative population of the respective areas. These imported samples originated in at least 27 countries.

Table 1. Distribution of samples based on product type and origin

Product type	Details	Number of imported samples
Beverages	Beverages (concentrates, energy, fruit, powders, sport, sugar, tea) and fruit juices	91
Botanical powders	Botanical and/or herbal powders	10
Infant foods	Infant cereals, formula, purees, and snacks	93
Processed fruit and vegetable products	Canned, jams, jellies, marmalades	20
Sauces	Cooking, dipping, and hot sauces	12
Sweets and desserts	Desserts (jelly, pudding) and sweet syrups	13
Water	Bottled water (carbonated, flat)	36
Total	**All product types**	**275**

How samples were analyzed and assessed

Samples were analyzed by an ISO/IEC 17025 accredited CFIA food testing laboratory. The laboratory quantified 6 phthalates: BBP, DBP, DEHP, DINP, and DNOP. The limit of detection (LOD) and limit of quantitation (LOQ) for each of these phthalates was 0.5 ppm and 1.0 ppm, respectively. The phthalate concentration is reported as the sum of the concentrations of all phthalate forms detected. The results are based on the food products as sold and not necessarily as they would be consumed.

Currently, no maximum level, tolerance, or standard has been established by Health Canada for phthalate levels in food; therefore, compliance with numeric Canadian regulations was not evaluated in this survey. The European Union has set migration limits for phthalates from food contact materials: 0.3 mg per kg of food for BBP, 1.5 mg per kg of food for DEHP, 9 mg per kg of food DINP and DIDP, and 30 mg per kg of food for DBP[3]. The United States has set a limit of 0.006 milligrams per liter (ppm) of DEHP in drinking water[12]. In the absence of a specific maximum level, the levels of phthalates detected were assessed by Health Canada on a case-by-case basis using the most current scientific data available.

Results of the survey

A total of 275 imported food products were tested in this survey. Of these samples, 274 (99.6%) did not contain detectable levels of phthalates. The 1 positive sample was an infant puffed snack that was imported from the United States. This sample contained 1.5 ppm of DINP and did not contain any other phthalate residues.

What the survey results mean

Table 2 presents the data from this survey compared with other studies where phthalates were analyzed in similar commodities. These studies include the CFIA survey from 2012 to 2018[11], the Health Canada Total Diet Study (Health Canada TDS[4]), the 24th Australian Total Diet Study (FSANZ TDS[5]), and published studies from Belgium (Van Holderbeke et al.[6]), China (Liu et al.[9]), Denmark (Peterson et al.[7]), Italy (Montuori et al.[10]), and the USA (Schecter et al.[8]). The current survey is bolded in the table for ease of identification.

Overall, the average levels and detection rates in the current survey were similar to or less than the comparison surveys in all categories. Differences in the results between these surveys can likely be attributed to the types of samples tested and the specific phthalates analyzed in each study.

Table 2. Minimum, maximum, and average results of total phthalates between various studies

Product type	Survey/study	Year(s)	Number of phthalates analyzed	Total number of samples	Number of samples with detected levels (%)	Average[a] level (ppm)
Beverages	**CFIA**	**2011-2012**	**6**	**91**	**0 (0)**	**n/a[b]**
Beverages	CFIA	2012-2018	6	589	2 (0.3)	0.48
Beverages	Health Canada TDS	2011-2015	21	16	7 (44)	0.10
Beverages	Schecter et al.	2013	9	10	6 (60)	0.021
Botanical powders	**CFIA**	**2011-2012**	**6**	**10**	**0 (0)**	**n/a[b]**
Dried herbs and spices	Health Canada TDS	2011-2015	21	1	1 (100)	0.776
Traditional medicinal herbs	Liu et al.	2026	8	6	0 (0)	n/a[b]
Infant food and formula	**CFIA**	**2011-2012**	**6**	**93**	**1 (1)**	**1.5**
Infant food and formula	CFIA	2012-2018	6	545	50 (9)	0.99
Infant food and formula	FSANZ TDS	2016	3	24	NR[c]	0.70
Infant food and formula	Health Canada TDS	2011-2015	21	9	9 (100)	0.051
Infant food and formula	Peterson et al.	2000	4	22	NR[c]	5.5
Processed fruit and vegetables	**CFIA**	**2011-2012**	**6**	**20**	**0 (0)**	**n/a[b]**
Processed fruit and vegetables	CFIA	2012-2018	6	170	44 (26)	2.3
Processed fruit and vegetables	FSANZ TDS	2016	3	12	NR[c]	2.1
Processed fruit and vegetables	Health Canada TDS	2011-2015	21	7	6 (86)	0.063
Sauces (cooking, dipping, hot)	**CFIA**	**2011-2012**	**6**	**12**	**0 (0)**	**n/a[b]**
Sauces (BBQ, pasta, pesto)	CFIA	2012-2018	6	146	25 (17)	33
Sauces (BBQ, ketchup, marinade)	Schecter et al.	2013	9	6	5 (83)	0.060
Sweets and desserts	**CFIA**	**2011-2012**	**6**	**13**	**0 (0)**	**n/a[b]**
Sweets and desserts	Health Canada TDS	2011-2015	21	3	3 (100)	0.025
Confectionary, soft	FSANZ TDS	2016	3	4	0 (0)	n/a[b]
Confectionary, syrup, etc.	Van Holderbeke et al.	2014	8	15	NR[c]	0.039
Water - bottled	**CFIA**	**2011-2012**	**6**	**36**	**0 (0)**	**n/a[b]**
Water - bottled	Health Canada TDS	2011-2015	21	2	0 (0)	n/a[b]
Water - bottled	Van Holderbeke et al.	2014	8	20	0 (0)	n/a[b]
Water - bottled	Montouri et al.	2008	6	142	NR[c]	0.002

Table notes

[a] Only positive results were used to calculate averages.
[b] n/a: not applicable – no phthalates detected.
[c] NR: not reported.

The results of this targeted survey were used to generate baseline surveillance data on the level of phthalates in selected foods available on the Canadian retail market, and to compare the phthalate levels in foods in this survey with that of other surveys and studies. All levels of phthalate found in the products tested in this survey were evaluated by Health Canada and deemed safe for consumption by Canadians.

How to access the survey data

The data associated with this report will be accessible on the Open Government Portal.

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