CODEX ALIMENTARIUS COMMISSION

Food and Agriculture Organization of the United Nations

World Health Organization

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Agenda Item 8 **CX/CF 21/14/8**

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JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX COMMITTEE ON CONTAMINANTS IN FOOD

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MAXIMUM LEVELS FOR LEAD IN CERTAIN FOOD CATEGORIES (At Step 4)

(Prepared by the Electronic Working Group chaired by Brazil)

Codex members and observers wishing to submit comments at Step 3 on this document should do so as instructed in CL 2021/13/OCS-CF available on the Codex webpage[1]

BACKGROUND

1. Lead exposure is associated with a wide range of effects, including various neurodevelopmental effects, impaired renal function, hypertension, impaired fertility and adverse pregnancy outcomes. Because of the neurodevelopmental effects, foetuses, infants and children are the subgroups that are most sensitive to lead. Since no safe level of lead could be identified by the Joint FAO/WHO Committee on Food Additives (JECFA), measures should be taken to identify major contributing sources and, if appropriate, to identify methods of reducing dietary exposure that are commensurate with the level of risk reduction.

2. Based on conclusions of 73rd JECFA Meeting (JECFA73) about dietary exposure of lead in 2011, work to reduce maximum levels (MLs) for lead established in the *General Standard for Contaminants in Food and Feed* (GSCFF) (CXS 193-1995) was undertaken since the 6th Session of the Codex Committee on Contaminants in Foods (CCCF06, 2012).

3. CCCF11 (2017) noted[2] that the work on the revision was limited to those food categories listed in CXS 193. However, there was wide support to continue working on new MLs for lead for a range of food categories. An EWG led by Brazil was established to prepare a discussion paper on a structured approach to prioritize commodities not included in CXS 193 and propose new MLs.

4. Work was done to identify food categories that did not have MLs for lead in CXS 193 and to prioritize food categories based on the impact in the intake and consideration on trade volumes. CCCF13 (2019) agreed with the selection and prioritization criteria elaborated and decided to focus the discussion on the food categories identified as high priority for the establishment of MLs (see further details under background information in Appendix II). Since JECFA did not identify a safe level for lead, the approach was to propose MLs that were "as low as reasonably achievable" (ALARA), considering the occurrence data and other relevant factors.

5. CCCF13 further agreed[3] to establish an Electronic Working Group (EWG) chaired by Brazil to prepare proposals for MLs for lead in eggs and egg products; aromatic herbs and spices; food for infant and young children (except those for which MLs have already been established in CXS 193); sugar and confectionery, excluding cocoa. Food categories were recognized to be broad, and CCCF13 therefore agreed[4] that an analysis of available data would assist in determining subcategories for which MLs should be established.

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1 Codex webpage/Circular Letters: http://www.fao.org/fao-who-codexalimentarius/resources/circular-letters/en/. Codex webpage/CCCF/Circular Letters: http://www.fao.org/fao-who-codexalimentarius/committees/committee/related-circular-letters/en/?committee=CCCF

2 REP 17/CF, paras. 85-86

3 REP 19/CF, para. 96

4 REP 19/CF, para. 93, Appendix VI

6. The 42nd Session of the Codex Alimentarius Commission (CAC42, 2019) approved[5] the new work as proposed by CCCF13.

7. In 2019 the EWG noticed[6] inconsistency with submission and extraction of data from GEMS/Food database. Due to the COVID-19 pandemic, CCCF14 was postponed from May 2020 to May 2021 and, in view of the additional time at the disposal of the Committee, an interim report of the EWG was published as CX/CF 20/14/8 and comments were requested through CL 2020/21/OCS-CF for further consideration by the EWG. The comments received in reply to this CL were compiled in CX/CF 20/14/8-Add.1. In addition, all members were invited to submit new data for all categories. In the new data extraction, in 2020, no inconsistencies were found during data analysis, which allowed to EWG discuss all categories indicated by CCCF.

8. Working documents issued during 2020, which has been revised or updated in 2021 for consideration by CCCF14, can be found on the Codex website[7].

9. This paper addresses the key points raised in response to CL 2020/21/OCS-CF as described below and presents proposed draft MLs based on the analysis in Appendix II.

KEY POINTS RAISED IN RESPONSE TO CL 2020/21/OCS-CF

10. In developing this document, the following points were raised:

Comments provided by some Codex members

- Support for the establishment of MLs

  In supporting work on the establishment of MLs, there was also support for the new MLs to be as low as reasonably achievable (ALARA principle).

- New call for data

  A new call for data was conducted in 2019 and 2020 on lead levels in eggs and egg products, culinary herbs and spices, foods for infants and young children, and sugar and confectionery, excluding cocoa, requesting submission of data preferably for the past 10 years. All data available were included in this document. Despite the new data included, there were suggestions to postpone the establisment of MLs for lead in sugar and confectionary, foods for infants and young children, duck eggs, spices and culinary herbs. However, the EWG considers there is enough data to propose ML for sugar and eggs. So, CCCF should discuss if it would be necessary to postpone establishing MLs for lead for all food categories or should indicate which MLs can be advanced to Step 5/8 at CCCF14.

- Outliers in dataset

  Considering that CCCF has not yet agreed upon a procedure to define which data could be considered outliers and how to deal with outliers in datasets, no data was removed at this time despite questions on the presence of outliers in the dataset.

- Rejection rate

  The rationale used to propose the different MLs was based on the approach used by CCCF in recent years to accept a maximum rejection rate of 5%. However, the 5% rejection rate could represent much more than 5% for some producer countries, even after the implementation of the code of practice (CoP). Additionally, probably the impact may be different for a product that can be reprocessed compared with the ones that should be destroyed. In this context, CCCF should discuss what rejection rate would be appropriate for different types of products and contaminants.

- Use of concentration factors to help guiding ML proposals for fresh and dried spices and culinary herbs

  Most of data corresponded to dried commodities suggesting those are the most important forms in international trade. So, the EWG considers that there would be benefits in establishing MLs for spices and culinary herbs in the dried form.

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[5] REP19/CAC, Appendix V

[6] JECFA calls for data are available at:
http://www.fao.org/food-safety/scientific-advice/calls-for-data-and-experts-expert-rosters/en/

[7] http://www.fao.org/fao-who-codexalimentarius/meetings/extra/cccf14-2020/en/

- Concern on the ML for lead in rhizomes, bulbs and roots because of high values of lead in turmeric due to adulteration with lead chromate

  The adulteration by lead chormate (PbCrO4) was already reported in scientific literature[8],[9] and in the European Union (EU), lead and chromate (CrO_4^{2-}) were detected in turmeric powder, resulting in seizure (RASFF 2019.1832) or recall (RASFF 2017.0547) of the product. To highlight the impact of lead in turmeric in the establishment of ML in the category of dried rhizomes, bulbs and roots, two scenarios of hypothetical MLs were calculated. So, CCCF should decide if it should be reasonable to establish a ML of 2.0 mg/kg for all dried rhizomes, bulbs and roots.

- Eggs / egg products: Establishment of MLs for preserved eggs

  Questions were raised on what kind of product a preserved egg is. There is not a harmonized definition for preserved eggs, so it was not possible to clearly identify the kind of process that was used for each sample or if all samples represent the same product. For this reason, the EWG considered not to establish MLs for eggs products, especially because it is possible to derive MLs for egg products based on MLs for eggs using processing factors. The importance of preserved eggs in international trade was also questioned.

- Cereal-based food for infants and young children: The "as consumed" approach

  Questions were raised about "as consumed" approach for cereal-based food for infants and young children*. A total of 2,357 results were expressed "as is" and 1,545 results were expressed "as consumed". Despite the larger number of samples expressed "as is", data expressed "as consumed" had more positive results and the origin of data is more globally representative. In case of infant formula and follow-up infant formula, the MLs were established expressed "as consumed". CCCF adopted this approach to be consistent because there are both liquid "ready-to-eat" formula and powder formula that requires the addition of liquid.*

  In general, cereal-based food for infants and young children are traded "as is", but considering the representativeness of the ML based in occurrence data of these products CCCF should decide in which kind of product the ML is applied, before or after preparation.

- Herbal teas for infants and young children

  The information available for herbal teas is not clear about the product characteristics (ready to drink or for preparing), which herbs were used. Considering these issues, CCCF should consider:

  - *To identify if there are herbal teas for infants and young children traded worldwide and, if appropriate, issue a call for data asking countries to indicate main herbs in composition and if the product is an infusion or the herbs for preparing tea.*
  - *Or not to establish ML for lead in herbal tea specific for infants and young children and establish ML for lead in teas and herbal teas (solid, dried).*

Comments provided by individual Codex members

- Geographic representation of data for spices and culinary herbs

  Data available from the GEMS/Food database came from Brazil, Canada, China, India, Japan, Singapore, Thailand, United States of America (USA) and EU, even though calls for data on the occurrence of lead in spices and culinary herbs have been published since 2019. In this work, for culinary herbs, 112 results for fresh herbs and 2,071 for dried herbs were considered. For spices, 58 data for fresh spices and 2216 for dried spices were evaluated. Considering CCCF already set ML with less quantity and representativity of samples, CCCF should decide if it would be reasonable to postpone establishing MLs for lead in dried spices and dried culinary herbs until further data became available.

- Considering a ML for spice mixes, particularly for ground spice

  Based on available data it was not possible to identify the composition of spices mixes. In general, they were excluded from the ML proposals. However, for mixed herbs it is possible to consider the same MLs for dried culinary herbs, once it is expected that herbs are composed just by leaves.

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8 Cowell, W., Ireland, T., Vorhees, D., Heiger-Bernays, W. (2017). Ground turmeric as source of lead exposure in the United States. Public Health Reports, 132(3): 289-293. DOI: 10.1177/0033354917700109.

9 Forsyth, J.E. et al. (2019). Turmeric means "yellow" in Bengali: lead chromate pigments added to turmeric threaten public health across Bangladesh. Environmental Research, 179: 108722. DOI: 10.1016/j.envres.2019.108722

- <u>Simplification of the spices and culinary herbs categories</u>

  In general, different description of culinary herbs and types of spices have been observed. To reduce the impact of categorization bias, the EWG took into consideration the terms registered in the Food Category, Food-name and the Codex Committee on Spices and Culinary Herbs (CCSCH)[10] documents. The categorization used the classification of CCSCH but not all samples could fit in one of the subcategories (e.g. mixture of spices).

- <u>Alignment of the ML for fresh herbs with the existing ML for lead in leafy vegetables</u>

  CCCF should discuss if would be reasonable to assume the same MLs for leafy vegetables for fresh culinary herbs.

CONCLUSION

11. Based on summary of the key points raised in response to CL 2020/21/OCS-CF, several questions need to be addressed in order to proceed with the discussion of the MLs proposed in Appendix I. New proposals are made for MLs for different priority categories based on the Analysis in Appendix II.

RECOMMENDATIONS

12. CCCF is invited to consider:

12.1 The following questions in order to enable consideration of the proposed MLs for the different food categories under consideration taking into accound the information provided in paragraph 10 and comments provided by Codex members and observers.

   a. Whether different rejections rates should be established for different types of products and contaminants other than the already agreed rejection rate of 5% currently being applied.

   b. If an ML should be established in dried spices and culinary herbs or whether to use concentration factors from the fresh products and assume the same MLs for lead in leafy vegetables.

   c. If it should established a 2.0 mg/kg ML for all dried rhizomes, bulbs and roots.

   d. To set an ML for eggs only, considering the lack of occurrence data for eggs products and because there is no harmonized definition for preserved eggs.

   e. To set an ML for cereal-based food for infants and young children “as is” or “as consumed”.

   f. Whether to set an ML for lead in herbal tea specific for infant and young children or for lead in teas and herbal teas (solid, dried).

12.2 The proposed MLs for the prioritized food categories, as shown in Appendix I, and decide which ones could be advanced to the Comission for final adoption or be returned to the EWG for further consideration taking into account the guidance provided on the questions put forward in paragraph 12, the background information providing the rationale for the proposed MLs as contained in Appendix II and comments submitted by Codex members and observers.

12.3 The re-establishment of the EWG to continue working on proposals for MLs for lead for the prioritized food categories taking into account the discussion held in plenary and the advice provided by the Committee on the points raised in paragraphs 12.1 and 12.2.

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[10] REP 17/SCH

APPENDIX I

MAXMUM LEVELS FOR LEAD IN CERTAIN FOOD CATEGORIES

(For comments at Step 3
based on the replies provided to the questions
put forward in the Recommendations[1])

Codex members and observers are kindly invited to consider the following proposals (the numbering does not represent any particular priority order):

1. Consider establishing a ML of 0.1 mg/kg for eggs;

2. Establish the following MLs for culinary herbs and spices:

Food	**ML (mg/kg)**
Culinary herbs (fresh leaves)	Include in ML for lead in leafy vegetables
Culinary herbs (dried leaves or mixed herbs)	2.0
Dried bulbs, rhizomes, roots spices	2.0
Bark	2.0
Dried fruits and berries spices	0.6
Dried seeds spices	0.6
Dried floral parts spices	0.7

3. Establish the following MLs for sugars and sugar-based candies:

Food	**ML (mg/kg)**
White and refined sugar	0.1
Raw and brown sugar	0.2
Syrup and molasses	0.1
Honey	0.1 or 0.05
Sugar-based candies (hard candy, soft candy, gummy and jellies, candy powder, marshmallow)	0.2

4. Taking into account the similarity between the proposed MLs for lead in fruit juices for infants and young children and the MLs already established in the *General Standard for Contaminants in Food and Feed* (CXS 193-1995) for fruit juices, the Committee should consider to change the fruit juice categories names already established in CXS 193 for: fruit juices including for infants and young children;

5. Establish the following MLs for food for infants and young children:

Food	**Propose of ML (mg/kg)**
Cereal-based products, expressed as consumed	0.04
Ready-to-eat meals	0.03
Herbal tea	0.6

[1] CX/CF 21/14/8, paragraph 12

APPENDIX II

SUMMARY REPORT

(For information)

LEAD OCCURRENCE IN FOODS

1. After the call for data, lead occurrence data were extracted from GEMS/Food database for food categories according to the EWG terms of reference, considering data submitted after 2008. Data were categorized based on the names entered by the countries on the fields: Food Category, Food Name, Local Food Name and Food State Name. The "Remarks" column was checked to see if there was some information to complete the classification.

2. Data that did not meet basic criteria, such as incomplete information, results from aggregated samples (i.e. samples reported as summary statistics rather than individually), results from samples collected before 2008, total diet studies (TDS), results on dry matter basis (dry weight) and results from multi-ingredient foods were removed. Although TDS samples provide realistic data on food contamination, the EWG considered inappropriate to propose MLs based on these results once they do not represent contamination profiles on products on the market. Data expressed in different basis (e.g., results on a "dry weight" basis) should be converted to a common basis; however the necessary information for conversion was not available in the GEMS/Food database.

3. All data was converted into the same unit (mg/kg). Not detected values (ND) were considered as being half of limit of detedtion (LOD) and values between LOD and the limited of quantification (LOQ) were treated as (LOD + LOQ)/2. This process resulted in the raw dataset.

4. A lot of data did not have information about the LOQ of the method. The absence of a LOQ does not allow an evaluation of whether theses samples achieved the LOQ criteria mentioned in the paragraph above. Nevertheless, omitting many samples could affect the results. A comparison was made to see if the statistics parameters would change if data without LOQ reported were omitted. No difference was observed in the mean and high percentiles (data not shown) and for this reason, data with no LOQ reported were included in the analysis.

5. Summary statistics including N+/N (number of positive results/total number of samples), mean, median, 95th and 97.5th percentile concentrations (abbreviated as P95TH and P97.5TH), minimum and maximum concentrations were determined considering the raw dataset for each category. The subcategories were identified according to the available data. Finally, hypothetical MLs and the rate of sample rejection were analyzed aiming to propose MLs to be established.

6. Since JECFA did not identify safe level of lead, the approach was to propose MLs that were "as low as reasonably achievable" (ALARA). In case of available consumption data, intake and the impact of hypothetical ML on it was calculated to complement the decisions.

ANALYSIS OF FOOD CATEGORIES

Eggs and egg products

7. Data for eggs and egg products were submitted from one region (European Union (EU)) and seven countries: Brazil, Canada, China, Japan, Singapore, Thailand and the United States of America (USA). The raw dataset for eggs and egg products consisted of 4,208 results from GEMS/Food database. A total of 3,254 data of fresh eggs were provided, with 64 results of duck eggs, 1,267 results identified as chicken eggs and 1,923 not specified. A total of 954 data were considered for egg products, but only for preserved eggs a significant amount of data is available with a total of 907 results (**Table A1**). Despite the significant amount of international traded of dried and frozen eggs, only few data were available.

8. Hypothetical MLs for lead in eggs and preserved eggs and its effect on sample rejection and intake reduction are shown in **Tables 1** and **2** respectively. For eggs, a ML of 0.03 mg/kg for lead on eggs would have a rejection rate of 2.9% however duck eggs showed mean levels higher then chicken eggs.

9. For preserved eggs it was not possible to clearly identify the kind of process was used for each sample or if all samples were the same product. In addition, the EWG considers that it is not necessary to establish MLs for eggs products because it is possible to derive MLs based on egg MLs using processing factors.

Table 1. Effect of the implementation of hypothetical MLs for lead in eggs

Eggs (n = 3,254)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.021	0.0126	0.0	0.0
0.1	0.015	0.0092	27.0	0.3
0.05	0.014	0.0087	31.1	1.5
0.04	0.014	0.0085	32.2	2.1
0.03	0.014	0.0084	33.0	2.9
0.02	0.013	0.0081	35.6	7.2
Chicken eggs (n = 1,267)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.024	0.015	0	0
0.1	0.010	0.006	58.4	0.6
0.05	0.009	0.005	64.3	2.5
0.04	0.008	0.005	65.8	3.4
0.03	0.008	0.005	66.7	4.0
0.02	0.006	0.004	75.8	14.9
Duck eggs (n = 64)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.040	0.024	0.0	0.0
0.1	0.040	0.024	0.0	0.0
0.08	0.033	0.020	16.7	7.8
0.05	0.025	0.015	37.0	25.0

*Egg consumption = 36.4 g/person/day and body weight = 60 kg.

Table 2. Effect of the implementation of hypothetical MLs for lead in preserved eggs

Preserved eggs (n = 907)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.436	0.265	0.0	0.0
3	0.215	0.1304	50.7	2.6
2	0.183	0.1108	58.1	4.1
1.5	0.168	0.1020	61.4	5.0
1	0.145	0.0882	66.6	6.8
Chicken preserved eggs (n = 465)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.482	0.2923	0.0	0.0
3	0.234	0.1419	51.5	3.4
2	0.189	0.1148	60.7	5.4
1.5	0.179	0.1085	62.9	6.0
1	0.155	0.0938	67.9	8.2
Duck preserved eggs (n = 438)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.391	0.2369	0.0	0.0
3	0.196	0.1191	49.7	1.8
2	0.177	0.1072	54.8	2.7
1.5	0.158	0.0957	59.6	3.9
1	0.137	0.0829	65.0	5.5

*****Egg consumption = 36.4 g/person/day and body weight = 60 kg.

Spices and culinary herbs

10. During the discussions in the EWG, one country indicated that the term "culinary herbs" would be more appropriate than "aromatic herbs" and hence the terminology was adopted in the document. Data for spices and culinary herbs were submitted from one region (European Union) and 14 countries: Australia, Brazil, Canada, Cuba, China, France, India, Japan, Nigeria, New Zealand, Republic of Korea, Singapore, Thailand and USA. Besides the criteria mentioned in paragraph 7, the EWG excluded data reported on this food category that were not considered spices or aromatic herbs by the Committee on Spices and Culinary Herbs (CCSCH)[12], for example: condiments, essence, extract, cooked, gelatine, hops, pectine, paste, resine, salted, sauce, seaweed, smoked, salt and yeast.

11. Based on the information reported, it was possible to classify culinary herbs as fresh and dried. Spices were divided into subcategories considering CCSCH classification, resulting in the subcategories fruits and berries; rhizomes, bulbs and roots (dried and fresh), bark, floral parts and seed. **Table 3** shows examples of products in each subcategory.

[12] REP 17/SCH

Table 3. Examples of foods on each subcategory of culinary herbs and spices

Food sub-categories	**Food** (examples)
Culinary herbs	Mixed herbs, anise, basil, celery, cilantro, chamomile, chives, coriander, dill, fennel leaves, holy basil, kaffir lime leaves, lemon grass, lemon basil, mint, oregano, parsley, thyme, sage, rosemary, celery.
Fruits and berries	Cardamom, cayenne, capers, chili red pepper, white pepper, black pepper, red pepper, paprika, ground chili, godji, tamarind, sumac, vanilla.
Floral parts	Cloves, chamomile flower, saffron.
Seed	Anise seed, cardamom, coriander seed, cumin seed, dill seed, fenugreek seed, funnel seeds, mustard, nutmeg.
Rhizomes. bulbs and roots	Ginger, garlic, galangal, turmeric (curcuma).
Bark	Cinnamon, cassia.

12. Data were analyzed separately for culinary herbs and spices (**Table B1**). It was possible to split culinary herbs in two subcategories: fresh and dried, with different contamination profiles. A total of 2,173 data for culinary herbs were considered, being 112 for fresh and 2,071 for dried. MLs of 0.2 mg/kg for fresh herbs and 2 mg/kg for dried herbs are proposed with a rejection rate less than 2.7% (**Table 4**). The impact of the establishment of hypothetical MLs for lead on dietary intake was evaluated for the GEMS/Food Cluster Diet with the highest consumption pattern for that group (worst case scenario). Cluster Diets with higher consumption patterns for culinary herbs was G09 (8.89 g/person/day).

Table 4. Effect of the implementation of hypothetical MLs for lead in culinary herbs

Fresh culinary herbs (n =112)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.05	0.007	0.0	0.0
1	0.05	0.06	0.0	0.0
0.6	0.05	0.07	0.0	0.0
0.2	0.04	0.07	14.4	2.7
Dried culinary herbs (n = 2,071)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.62	0.091	0	0.0
2	0.16	0.024	73.9	1.7
1.5	0.13	0.019	78.9	3.6
1	0.12	0.018	80.5	4.1

*Culinary herbs raw (included dried) consumption = 8.89 g/person/day; body weight = 60 kg.

13. A total of 2,876 data were considered for spices, but it was not possible to classify all samples in the subcategories mentioned (e.g. mace). For spices, 58 data were for fresh spices and 2,216 for dried spices. The impact of the establishment of hypothetical MLs for lead on dietary intake was evaluated in each subcategory for the GEMS/Food Cluster Diet with the highest consumption pattern for that group (worst case scenario). Cluster Diets with higher consumption patterns for fruit spices and berries spices was G06 (30.0 g/person/day); for spices classified as rhizomes, bulbs and roots was G11 (1.34 g/person/day), for bark was G12 (0.40 g/person/day), for spices classified as bud spices and floral parts was G04 (1.52 g/person/day) and for seeds was G14 (1.51 g/person/day).

14. Intake reduction due to the establishment of MLs for lead on spices and the impact on rejection rates are show on **Table 5**. It was not proposed a ML for lead in fresh rhizomes, bulbs and roots and for fresh seeds, because there were only 9 and 25 results in these categories respectively. MLs proposed with a rejection rate, in general, from 2.5% to 5% are as follow.

15. Some members presented concern about the ML for lead in rhizomes, bulbs and roots because it could be influenced by high values of lead in turmeric due adulteration with lead chromate ($PbCrO_4$). It was already reported in scientific literature [13],[14] the turmeric adulteration with this yellow pigment to enhance its brightness and in European Union, lead and chromate (CrO_4^{2-}) were detected in turmeric powder, resulting in seizure (RASFF 2019.1832) or recall (RASFF 2017.0547) of the product. To highlight the impact of lead in turmeric in the establishment of ML in the category of dried rhizomes, bulbs and roots, two scenarios of hypothetical MLs were calculated: ML for lead in dried rhizomes, bulbs and roots and ML for lead in dried rhizomes, bulbs and roots, excluding turmeric. Hypothetical ML for lead in rhizomes, bulbs and roots excluding turmeric had lower sample rejection. Based on Table 5 the EWG asks if it should be reasonable established a 2.0 mg/kg ML for all dried rhizomes, bulbs and roots.

Table 5. Effect of the implementation of hypothetical MLs for lead on spices

Dried Fruits and berries (n =1,155)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.28	0.043	0	0.0
1.0	0.19	0.028	34.5	1.4
0.8	0.17	0.025	41.4	2.8
0.6	0.17	0.024	44.8	4.4
Dried rhizomes, bulbs and roots (n = 494)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	2.17	0.049	0	0.0
3	0.28	0.006	87.1	4.3
2.5	0.24	0.005	89.4	5.7
2.0	0.24	0.005	89.4	5.7
1.5	0.22	0.005	90.3	7.3
1.0	0.20	0.004	90.8	8.5

13 Cowell, W., Ireland, T., Vorhees, D., Heiger-Bernays, W. (2017). Ground turmeric as source of lead exposure in the United States. Public Health Reports, 132(3): 289-293. DOI: 10.1177/0033354917700109.

14 Forsyth, J.E. et al. (2019). Turmeric means "yellow" in Bengali: lead chromate pigments added to turmeric threaten public health across Bangladesh. Environmental Research, 179: 108722. DOI: 10.1016/j.envres.2019.108722

Dried rhizomes, bulbs and roots, excluding turmeric (n =154)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.33	0.006	0	0
3	0.22	0.004	33.5	1.9
2.0	0.17	0.003	48.1	3.9
1.5	0.15	0.003	54.5	5.2
1.0	0.13	0.003	59.8	6.5
0.5	0.09	0.002	72.1	12.3
Dried Bark (n = 127)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.90	0.006	0	0.0
4.0	0.40	0.003	55.4	3.9
3.0	0.40	0.003	55.4	3.9
2	0.38	0.003	57.3	4.7
1.0	0.34	0.002	62.1	7.0
Dried Floral parts (n = 86)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.09	0.0025	0.0	0.0
1	0.09	0.0025	0.0	0.0
0.8	0.09	0.0023	7.4	1.2
0.7	0.07	0.0018	27.9	3.5
0.6	0.05	0.0013	48.5	5.8
Dried Seeds (n = 302)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)**	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.12	0.0031	0.0	0.0
1	0.10	0.0025	17.9	0.3
0.8	0.09	0.0023	42.6	2.0
0.6	0.05	0.0013	58.9	3.0
0.4	0.04	0.0010	67.2	5.3

* Consumption raw (included dried) of fruit spices and berries spices = 30.0 g/person/day; for spices classified as rhizomes, bulbs and roots = 1.34 g/person/day, for bark = 0.40 g/person/day, for spices classified as bud spices and floral parts = 1.52 g/person/day and for seeds = 1.51 g/person/day; body weight = 60 kg.

Sugar and confectionery

16. Sugar and confectionery data were submitted from two regions (Africa and European Union) and ten countries: Australia, Brazil, Canada, China, Cuba, France, New Zealand, Singapore, Thailand and USA. Lead occurrence data are presented in **Table C1.** The raw dataset for sugar and confectionary consisted of 7,739 results from GEMS/Food database. A total of 5,911 data of sugars (white, raw, brown, demerara, cane, aromatized sugars, honey, syrup and molasses) were provided and 1,828 data were considered for sugar-based candies (hard, soft/chewy, gummy and jelly, marshmallow, powder candies).

17. Sugars were classified in honey (n = 2,684), syrup and molasses (n = 440), total sugars (n = 1,380), white sugar (n = 612), raw sugar (n = 123), brown sugar (n = 93), cane sugar (n = 381), flavoured sugar (n = 40), others and not specified (n = 158). Syrup category was represented by almond, barley, corn, brown rice, glucose, maple and sugar beet syrups (flavoured or not). In confectionary category, candies were considered as hard candies (n = 658), soft/chewy candies (n = 245), gummy and jelly (n = 333), marshmallow (n = 47), powder candies (n = 54), mint dragees (n = 7) and not specified (n = 484).

18. Hypothetical MLs for lead in sugars and sugar-based candies and its effect on sample rejection and intake reduction are shown in **Tables 6** and **7** respectively. The impact on dietary intake of the establishment of hypothetical MLs for lead on candies was evaluated considering the mean consumption of data obtained from FOSCOLLAB database. Sugar consumption data were derived from GEMS/Food Cluster Diets considering de worst consumption scenario (highest cluster diet consumption). Analysis of available data on GEMS/Food showed mean occurrence levels of 0.41 mg/kg for sugars and 0.03 mg/kg for sugar-based candies. Establishing ML of 0.2 mg/kg for lead on sugars and cadies would have a rejection rate of 3.4% and 1.1%, respectively.

19. Brown sugar had higher mean and 95th percentile than white and refined sugar, therefore EWG considered a different ML for these two categories. Although lead occurrence in raw sugar showed similar profile of white sugar, by coherence EWG considered this category should have higher ML than white sugar and can be similar to brown sugar.

Table 6. Effect of the implementation of hypothetical MLs for lead on sugars

White and refined sugar (n = 614)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.015	0.029	0.0	0.0
0.1	0.011	0.021	26.0	1.1
0.05	0.008	0.015	47.7	5.7
0.04	0.006	0.012	58.2	9.4
Raw sugar (n = 129)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.026	0.022	0.0	0.0
0.1	0.012	0.010	54.8	2.3
0.05	0.008	0.007	69.6	7.0
0.04	0.006	0.005	77.4	11.6

Brown sugar (n = 94)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.046	0.090	0.0	0.0
0.15	0.038	0.074	16.9	4.3
0.1	0.035	0.069	22.7	6.4
0.05	0.023	0.044	50.6	23.4
Honey (n = 2,684)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.025	0.0013	0.0	0.0
0.1	0.015	0.0008	40.8	1.4
0.05	0.013	0.0007	49.0	4.2
0.04	0.011	0.0006	54.8	8.1
Syrup and molasses (n = 440)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.020	0.000027	0.0	0.0
0.1	0.011	0.000015	45.1	3.6
0.05	0.010	0.000013	52.3	5.2
0.04	0.007	0.000010	62.9	10.5

*Raw sugar consumption = 50.91 g/person/day; sugar consumption = 117.73 g/person/day; honey consumption = 3.06 g/person/day; syrup and molasses consumption = 0.08 g/person/day; body weight = 60 kg.

Table 7. Effect of the implementation of hypothetical MLs for lead on sugar-based candies

Candies (n = 1,834)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.025	0.00120	0.0	0.0
0.2	0.022	0.00106	12.0	1.1
0.15	0.017	0.00080	33.2	4.7
0.1	0.016	0.00078	35.0	5.2
0.05	0.010	0.00049	59.4	17.3

Hard candies (n = 658)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.026	0.0012	0.0	0.0
0.2	0.022	0.0010	16.0	1.1
0.15	0.017	0.0008	34.7	4.4
0.1	0.017	0.0008	35.6	4.7
0.05	0.011	0.0005	57.5	16.0
Soft candies (n = 245)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.031	0.0015	0.0	0.0
0.2	0.030	0.0014	4.9	0.8
0.15	0.023	0.0011	25.8	5.7
0.1	0.023	0.0011	25.8	5.7
0.05	0.011	0.0005	65.0	29.4
Gummy and jelly (n = 333)				
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Lead intake (µg/kg b.w.)***	**Intake reduction (%)**	**Sample rejection (%)**
No ML	0.019	0.00090	0.0	0.0
0.2	0.018	0.00086	5.2	0.3
0.15	0.011	0.00054	40.3	3.9
0.1	0.011	0.00054	40.3	3.9
0.05	0.010	0.00045	49.7	6.6

*Mean candies consumption = 2.8655 g/person/day (FOSCOLLAB data); body weight = 60 kg.

Food for infant and young children

20. Due to the sensitivity of infants and young children for lead[15], CCCF13 agreed to prioritize food for this group to evaluate the subcategories by applying the ALARA principles.

21. Food for infant and young children data were submitted from one region (European Union) and nine countries: Australia, Brazil, Canada, China, Japan, New Zealand, Singapore, Thailand and USA. Excluding data for infant formula, formula for special medical purposes intended for infants and follow-up formula and considering information on the column "WHO Food Identifier", four subcategories were identified: cereal-based food (n = 3,902), fruit juice and herbal tea (n = 395), ready-to-eat meal (n = 3,939) and yoghurt, cheese and milk based dessert (n = 217). For the subcategory cereal-based infant food, samples from total diet studies were not included (**Table D1**).

[15] Seventy-third report of the Joint FAO/WHO Expert Committee and Food Additives. WHO Technical Report Series 960

22. A total of 3,902 data for cereal-based food for infant and young children were considered, being 2,357 expressed as is and 1,545 expressed as consumed. Hypothetical MLs for lead in cereal-based food are shown in **Table 8.** Despite the larger number of samples expressed “as is”, data expressed “as consumed” had more positive results and the origin of data is more globally representative.

Table 8. Effect of the implementation of hypothetical MLs for lead on cereal-based food for infant and young children.

Cereal-based food expressed “as is” (n = 2,537)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.007	0.0
0.05	0.006	0.3
0.04	0.005	2.6
0.03	0.005	2.6
0.01	0.005	3.0
Cereal-based food expressed “as consumed” (n = 1,545)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.012	0.0
0.05	0.009	2.0
0.04	0.008	4.7
0.03	0.007	7.1

23. A total of 395 data for fruit juice and herbal tea for infant and young children were considered, being 323 of fruit juice. A total of 53 results were about juice with berries or small fruits and the lead mean levels were lower than the total of fruit juice. Hypothetical MLs for lead in fruit juice and herbal tea are shown in **Table 9.**

24. The ML proposed for lead in fruit juice for infant and young children was similar that ML established for fruit juice (0.03 mg/kg), juices with berries and other small fruits (0.05 mg/kg) and grape juice (0.04 mg/kg). Therefore the EWG considers including a note that fruit juice for infant and young children are also included in ML for lead in fruit juices.

25. A total of 46 data of herbal teas was analyzed. The information available about herbal teas did not describe if products were ready to drink or raw materials and which herbs were used.

26. Since there is not a ML established for lead in herbs and teas, considering the sensitivity of this group and the impact of raw material contamination in process products levels, the EWG asks if it should be established a ML for lead in herbal tea for infant and young children and also for raw materials.

Table 9. Effect of the implementation of hypothetical MLs for lead on fruit juice and herbal tea for infant and young children on sample rejection (raw dataset).

Fruit juice (n = 323)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.0192	0
0.05	0.0082	0.3
0.04	0.0077	1.9
0.03	0.0075	2.2
0.02	0.0074	3.1
0.01	0.0066	10.2

Herbal tea (n = 46)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.082	0.0
0.6	0.044	4.3
0.3	0.031	6.5
0.2	0.019	10.9

27. A total of 3,939 data for ready-to-eat meal for infant and young children were considered, including ready-to-eat meal based on fruits (n = 912), based on vegetables (n = 407), with fruits and vegetables (n = 82), based on meat (n = 518), as a mixture of meat, vegetables and fruits (n = 991) and 1,029 not specified. Hypothetical MLs for lead in ready-to-eat meal for infant and young children are shown in **Table 10.**

Table 10. Effect of the implementation of hypothetical MLs for lead on ready-to-eat meal for infant and young children

Ready-to-eat meal (n = 3,939)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.011	0.0
0.03	0.007	2.8
0.02	0.006	5.8
0.01	0.005	14.8
Ready-to-eat meal based on meat (n = 518)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.009	0.0
0.03	0.006	2.9
0.02	0.006	5.4
0.01	0.005	13.5
Ready-to-eat meal based on fruits (n = 912)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.013	0.0
0.04	0.007	2.9
0.03	0.006	4.6
0.02	0.005	8.1
Ready-to-eat meal based on vegetables (n = 407)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.010	0.0
0.03	0.008	1.0
0.02	0.008	4.2
0.01	0.005	22.6

Ready-to-eat meal based on fruits and vegetables (n = 82)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.005	0.0
0.02	0.005	0.0
0.01	0.004	6.1
Ready-to-eat meal - mix (n = 991)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.007	0.0
0.02	0.006	2.0
0.01	0.005	13.7

28. A total of 217 data for yoghurt, cheese and milk based dessert for infant and young children were considered, being 167 based on yoghurt. Hypothetical MLs for lead in yoghurt, cheese and milk based dessert are shown in **Table 11.** As the composition of this category is a complex mixture, CCCF should consider not establishing a ML.

Table 11. Effect of the implementation of hypothetical MLs for lead on yoghurt, cheese and milk based dessert for infant and young children

Yoghurt, cheese and milk based dessert (n = 217)		
ML (mg/kg)	**Mean lead occurrence (mg/kg)**	**Sample rejection (%)**
No ML	0.007	0.0
0.03	0.006	1.4
0.02	0.005	6.9
0.01	0.004	11.9

ANNEX I: Tables

Table A1. Lead concentrations in eggs and eggs products (raw dataset)

Food Category	Countries data	N + / N	Mean (mg/kg)	Median (mg/kg)	95TH Percentile (mg/kg)	97.5TH Percentile (mg/kg)	Min (mg/kg)	Max (mg/kg)
Fresh eggs								
Eggs	Canada, China, Japan, Singapore, Thailand, USA, WHO European Region	225/3,254	0.02	0.02	0.03	0.04	0.00003	16.7
Chicken eggs	Canada, China, Japan, Singapore, Thailand, USA WHO European Region	152/1,267	0.02	0.01	0.03	0.05	0.00003	16.7
Duck eggs	China, Thailand, WHO European Region	40/64	0.04	0.04	0.10	0.12	0.003	0.14
Egg yolk	WHO European Region	0/1	0.005	-	-	-	-	-
Egg products								
Preserved	China, Singapore, USA	688/907	0.44	0.06	1.51	3.35	0.0001	27.7
Chicken	China	373/465	0.48	0.07	2.09	4.33	0.001	14.5
Duck	China, Singapore, USA	313/438	0.39	0.05	1.39	2.11	0.0001	27.7
Quail	China	2/4	0.09	0.08	0.19	0.20	0.003	0.2
Dried, whole	WHO European Region	2/8	0.02	0.004	0.05	0.05	0.0001	0.05
Dried, yolk	Brazil, WHO European Region	2/2	0.03	0.03	0.04	0.04	0.02	0.04-
Dried, white	Brazil, WHO European Region	1/2	0.01	0.01	0.01	0.01	0.002	0.01
Salted egg	China, Singapore, Thailand, USA	15/30	0.07	0.01	0.42	0.51	0.0005	0.52
Salted yolk	USA	1/1	0.02	-	-	-	-	-
Boiled	USA	2/2	0.02	0.02	0.02	0.02	0.005	0.03
Braised	Singapore	0/1	0.05	-	-	-	-	-

N^+/N = positive samples/total samples.

Table B1. Lead concentrations in spices and culinary herbs and subcategories (raw dataset).

Food Category	Countries	N+ / N	Mean (mg/kg)	Median (mg/kg)	95th Percentile (mg/kg)	97.5th Percentile (mg/kg)	Min (mg/kg)	Max (mg/kg)
Culinary herbs								
Fresh	Canada, USA	99/112	0.05	0.02	0.18	0.21	0.0005	0.27
Dried	Brazil, Canada, China, India, Singapore, Thailand, USA, WHO European Region	1,504/2,071	0.62	0.03	1.08	2.01	0.0001	350
Spices								
Fruits and berries	Brazil, India, Indonesia, Singapore. Thailand, USA.WHO European Region	885/1,155	0.28	0.13	0.61	0.91	0.0001	49.1
Rhizomes, bulbs and roots (fresh)	India, Thailand, WHO European Region	26/33	0.18	0.02	0.92	1.42	0.003	2.54
Ginger (fresh)	India, WHO European Region	23/30	0.05	0.01	022	0.42	0.003	0.72
Total rhizomes, bulbs and roots (dried)	Brazil, China, India, Indonesia, Japan, Singapore, Thailand, USA., WHO European Region	428/494	2.17	0.13	2.64	40.61	0.0007	135.7
Turmeric (dried)	Brazil, China, India, Indonesia, Japan, Singapore, Thailand, USA., WHO European Region	309/340	3.08	0.16	9.03	47.6	0.0000	135.7
Garlic (dried)	Brazil, Singapore	22/30	0.10	0.015	0.38	0.46	0.008	0.63
Ginger (dried)	Brazil, China, India, Indonesia, Japan, Singapore, Thailand, USA., WHO European Region	97/124	0.39	0.02	1.80	2.65	0.0013	6.0
Bark	Brazil, India, Indonesia, Singapore, Thailand, USA, WHO European Region	101/129	0.90	0.31	2.04	5.39	0.0005	23.8

Food Category	**Countries**	**N+ / N**	**Mean (mg/kg)**	**Median (mg/kg)**	**95th Percentile (mg/kg)**	**97.5th Percentile (mg/kg)**	**Min (mg/kg)**	**Max (mg/kg)**
Floral parts	Indonesia, Singapore, Thailand, WHO European Region	55/86	0.08	0.005	0.64	0.76	0.0001	0.99
Seed (fresh)	Canada, USA	24/25	0.04	0.02	0.16	0.22	0.003	0.31
Seed (dried)	Brazil, Canada, India, Indonesia, Singapore, Thailand, USA, WHO European Region	190/302	0.12	0.05	0.44	0.76	0.001	1.41

N^+/N = positive samples/total samples.

Table C1. Lead concentrations in sugar, confectionery and subcategories (raw dataset).

Food Category	Countries	N + / N	Mean (mg/kg)	Median (mg/kg)	95th Percentile (mg/kg)	97.5th Percentile (mg/kg)	Min (mg/kg)	Max (mg/kg)
Sugars	Australia, Brazil, Canada, China, Cuba, France, New Zealand, Singapore, USA, WHO African Region, WHO European Region	503/1380	0.41	0.01	0.12	0.50	0.0001	201
White and refined sugar	Australia, Brazil, Canada, China, Singapore, Thailand, WHO European Region	69/614	0.01	0.01	0.06	0.08	0.0001	0.83
Brown sugar	Brazil, Singapore, USA, WHO European Region	29/93	0.05	0.03	0.15	0.21	0.0015	0.23
Raw sugar	Singapore, Thailand, USA	18/129	0.03	0.01	0.08	0.12	0.0005	1.1
Flavoured sugar	WHO European region	7/40	0.02	0.003	0,16	0.16	0.0025	0.25
Cane sugar, not specified	Brazil, Cuba, Singapore, USA, WHO European region	344/372	0.01	0.01	0.02	0.04	0.0015	0.17
Honey	Australia, Brazil, Canada, France, New Zealand, Singapore, Thailand, USA, WHO European Region	832/2684	0.03	0.01	0.05	0.09	0.00007	9.3
Syrup and molasses	Brazil, Canada, Singapore, USA, WHO European region	184/440	0.02	0.006	0.06	0.20	0.0001	0.79
Candies	Canada, Brazil, France, Singapore, USA, WHO European Region	1110/1834	0.03	0.01	0.11	0.20	0.00007	1.75
Soft candy	Brazil, Canada, Singapore, USA, WHO European region	138/245	0.03	0.02	0.11	0.20	0.0002	0.22
Hard candy	Brazil, Canada, Singapore, USA, WHO European region	373/658	0.03	0.01	0.09	0.20	0.0002	1.75
Gummy	Canada, Singapore, USA, WHO European region	227/333	0.02	0.01	0.07	0.20	0.00007	0.35

Food Category	Countries	N + / N	Mean (mg/kg)	Median (mg/kg)	95th Percentile (mg/kg)	97.5th Percentile (mg/kg)	Min (mg/kg)	Max (mg/kg)
Powder candy	USA	43/54	0.01	0.01	0.03	0.06	0.0007	0.10
Marshmallow	Canada, Singapore, USA, WHO European region	20/47	0.03	0.01	0.20	0.20	0.0007	0.20

N^+/N = positive samples/total samples.

Table D1. Lead concentration in food for infants and young children (raw dataset).

Food category	Countries	N+ / N	Mean (mg/kg)	Median (mg/kg)	95th Percentile (mg/kg)	97.5th Percentile (mg/kg)	Min (mg/kg)	Max (mg/kg)
Cereal-based food for infant and young children								
Expressed "as is"	Japan, Singapore	5/2,357	0.007	0.005	0.005	0.045	0.0025	0.3
Expressed "as consumed"	Australia, Canada, New Zeland, Singapore, USA, WHO European Region	452/1,545	0.012	0.005	0.035	0.050	0.0001	0.32
Fruit juice and herbal tea for infants and young children								
Total	Canada, China, Singapore, USA, WHO European Region	209/395	0.03	0.01	0.02	0.05	0.00001	3.56
Herbal Tea	WHO European Region	28/46	0.08	0.01	0.55	0.87	0.001	0.901
Fruit juice	Canada, China, Singapore, USA, WHO European Region	179/323	0.02	0.01	0.02	0.03	0.00001	3.56
Juice with berries and small fruits	Canada, USA	35/53	0.01	0.01	0.01	0.02	0.0005	0.02
Ready-to-eat meal for infants and young children								
Total	Australia, Brazil, Canada, China, New Zealand, Singapore, Thailand, USA, WHO European Region	739/3,939	0.01	0.005	0.03	0.04	0.0002	1.2
Ready-to eat meal (meat based)	Brazil, Canada, USA, WHO European region	136/518	0.01	0.004	0.03	0.04	0.0005	0.2
Ready-to eat meal (fruit based)	Brazil, Canada, China, Singapore, USA, WHO European region	189/912	0.01	0.005	0.03	0.05	0.0002	1.0
Ready-to-eat meals (vegetables based)	Brazil, Canada, Singapore, USA, WHO European Region	100/407	0.01	0.005	0.02	0.03	0.0006	0.2
Ready-to-eat meals (fruits and vegetables based)	Canada, China, Thailand, USA	18/82	0.01	0.004	0.02	0.02	0.0004	0.02
Ready-to-eat meals (mix)	Brazil, Canada, China, Singapore, Thailand, USA, WHO European region	169/991	0.01	0.005	0.02	0.02	0.0003	0.2

Food category	Countries	N+ / N	Mean (mg/kg)	Median (mg/kg)	95th Percentile (mg/kg)	97.5th Percentile (mg/kg)	Min (mg/kg)	Max (mg/kg)
Yogurt and cheese milk based dessert for infants and young children								
Total	Australia, Canada, China, New Zealand, Singapore,USA, WHO European Region	45/217	0.007	0.004	0.03	0.03	0.0003	0.1
Yogurt	Canada, China, Singapore, USA, WHO European region	8/73	0.006	0.004	0.02	0.02	0.0003	0.03

N^+/N = positive samples/total samples.

APPENDIX III

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