



**JOINT FAO/WHO FOOD STANDARDS PROGRAMME  
CODEX COMMITTEE ON CONTAMINANTS IN FOODS**

**14<sup>th</sup> Session  
Utrecht, The Netherlands, 20 – 24 April 2020**

**MATTERS OF INTEREST ARISING FROM FAO AND WHO (INCLUDING JECFA):  
MAXIMUM LEVELS FOR CADMIUM IN CHOCOLATES AND COCOA-DERIVED PRODUCTS**

(Prepared by the FAO/WHO JECFA Secretariats for consideration under Agenda Items 5 and 6)

**BACKGROUND**

1. The 77<sup>th</sup> Meeting of the Joint FAO/WHO Expert Committee on Food Additives (JECFA77, 2013) carried out its latest dietary exposure assessment to cadmium from all sources, including from the consumption of cocoa products, and concluded that the total exposure to cadmium from cocoa and cocoa products even for high consumers would not be of safety concern.
2. Further to the request of 13<sup>th</sup> Session of the Codex Committee on Contaminants in Foods (CCCF13, 2019) for more updated occurrence data for cadmium in food, the JECFA Secretariat issued a call for data on cadmium in chocolates and cocoa-derived products in 2019. New data have been submitted to the Global Environment Monitoring System of food contamination database (GEMS/Food) in response to that call.
3. The new submitted data are also available to the Electronic Working Group (EWG) chaired by Ecuador and co-chaired by Ghana that has been asked by CCCF13 to propose maximum levels (MLs) for cadmium in chocolates and cocoa-derived products (Agenda Item 6) and to Codex members and observers when commenting on the draft ML of 0.3 mg/kg for cadmium in chocolates containing / declaring <30% total cocoa solids on a dry matter basis (Agenda Item 5) to be both considered at CCCF14 (2021).<sup>1</sup>
4. The JECFA Secretariat notes that the new data submitted to the GEMS/Food database provide a more global dataset than the one used for the evaluation at JECFA77. The JECFA Secretariat has done a first preliminary analysis of how the new occurrence data would change the dietary exposure assessment to cadmium from chocolates and cocoa-derived products and would like to offer the following observations to CCCF14.

**RESULTS**

Previous evaluations of the JECFA 73<sup>rd</sup> and 77<sup>th</sup> meetings and dietary exposure estimates to cadmium from all food sources and from cocoa and cocoa products

5. JECFA73 (2010) re-evaluated cadmium and established a provisional tolerable monthly intake (PTMI) of 25 µg/kg bw, reflecting the long half-life of cadmium in humans. Based on the national assessments of dietary exposure to cadmium that was submitted by Australia, China, Europe, Japan and the United States of America (USA), and those that were reviewed from the literature for Chile, Lebanon and the Republic of Korea. JECFA concluded that mean dietary exposure to cadmium for the general population ranged from 2.2 to 12.9 µg/kg bw per month (9-48% of the PTMI). The highest dietary exposures of 22 µg/kg bw per month (88% PTMI) was reported for children 0.5-12 years of age from Europe.

<sup>1</sup> REP19/CF, paras. 45-56, REP19/CAC, paras. 52-67  
Working documents, including report of CCCF and CAC meetings, are available on the Codex website at:  
<http://www.fao.org/fao-who-codexalimentarius/committees/committee/related-meetings/en/?committee=CCCF>  
<http://www.fao.org/fao-who-codexalimentarius/committees/cac/meetings/en/>

6. It is noted that the cadmium occurrence data and consumption of foods containing cocoa and its derivatives were included in these estimates and that these products were not considered as the main food items contributing to the overall exposure to cadmium. The food categories that contributed most to total cadmium exposure in all countries were cereals/grains, vegetables, meat and poultry offal and seafood (especially molluscs)<sup>2</sup>.
7. At the request of CCCF06 (2012), JECFA77 assessed the dietary exposure to cadmium from cocoa and cocoa products in the context of the overall dietary exposure to cadmium from all sources.
8. Table 1 presents the national dietary exposure estimates for Cadmium in µg/kg bw per month. The data are presented using the appropriate mean occurrence data with the consumption of cocoa derivatives (cocoa beverages, cocoa powder and other cocoa products) that were derived from individual records of 36 different consumption surveys. Highest estimated mean and 97.5<sup>th</sup> percentile from consumers only of cocoa products were in adult population 2.3 and 8.8 µg/kg bw per month, respectively and for children 2.3 and 12 µg/kg bw per month, respectively. In these estimates, the highest 97.5<sup>th</sup> dietary exposure in the adult and children population represents 35% and 48% of the PTMI of 25 µg/kg bw per month respectively from consumers only of cocoa powder.
9. JECFA77 concluded that contributions from products containing cocoa and its derivatives to total cadmium exposure for high consumers of these products were below the PTMI and therefore were not considered to be of concern.

**Table 1: Dietary exposure estimates to Cadmium (JECFA77) in µg/kg bw per month from consumption of cocoa derivatives (cocoa beverages, cocoa powder, other cocoa products)**

	Whole population	Consumers only (a)	
	Mean	Mean	97.5 <sup>th</sup> percentile
<b>Adults</b>			
EU	0.15	1.2	5.2
China (b)	0.003	2.3	8.8
Brazil	0.17	1	3.2
<b>Children</b>			
EU	0.6	2.3	12
China	0.005	1.1	7.8

(a) highest estimated mean or 97.5<sup>th</sup> percentile from consumers only of cocoa products (e.g, cocoa powder for EU adults and children)

(b) women of childbearing age

Occurrence data for cadmium in cocoa and cocoa products

10. A summary of the cadmium occurrence data from cocoa products submitted to JECFA73 and JECFA77 is presented in Table 2.
11. Since JECFA77, the current number of submitted occurrence data to cadmium for cocoa products have increased considerably. In particular new occurrence data representing producers of cocoa products in other parts of the worlds than the ones used in the 2013 JECFA evaluation have been submitted.
12. Most of the occurrence data for cocoa products submitted to JECFA77 were from the European region. This is consistent with the mean occurrence level that has been reported in the [draft ML for chocolates containing / declaring <30% total cocoa solids on a dry matter basis for consideration at CCCF14]. Here the mean occurrence from cocoa powder is of the same order of magnitude of the mean occurrence level that was described in the report of the JECFA 77, respectively 178 µg/kg vs 130 µg/kg.

<sup>2</sup> JECFA 73<sup>rd</sup> report 2010 (p157)  
 JECFA publications are available at: <https://www.who.int/foodsafety/publications/jecfa/en/>  
<http://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-publications/en/>

13. The analysis of the distribution parameters for cadmium in cocoa and cocoa products between the dataset submitted to JECFA77 (which mainly consisted of data submitted from EU) and, the current worldwide dataset submitted to inform the work of the EWG as well as comments on the draft ML of 0.3 mg/kg presented in Table 2.
14. The comparative analysis shows that the mean cadmium concentration level in the current 2020 submission, is at least for the cocoa powder noticeable higher than it was at the time of the 77<sup>th</sup> JECFA evaluation (i.e., 560 µg/kg vs 130 µg/kg).
15. This may be contributable, at least in part, to the fact that the highest observed concentrations in the 2020 submission were from the Codex regions of Latin America and Caribbean (LAC), ASIA and North America and South West Pacific (NASWP) for which no data were available at the time of the evaluation made by JECFA77.
16. Overall, the new submitted data seem to suggest that the exposure from the consumption of cocoa products might contribute more to the total cadmium exposure for high consumers than the data available to JECFA77 indicated.

**Table 2: Distribution of occurrence concentration data to Cadmium in µg/kg in Cocoa products (worldwide)**

<b>Data submitted for the JECFA77 meeting (2013)</b>			
<b>Products</b>	<b>Number of samples</b>	<b>Mean</b>	<b>P97.5th or P95th percentile</b>
<i>cocoa beverage</i>	137	35	160
<i>cocoa powder (a)</i>	1292	130	430
<i>other cocoa products (including chocolate)</i>	1954	76	361
<b>New data submitted in response to JECFA call for data (2020)</b>			
<b>Products</b>	<b>Number of samples</b>	<b>Mean</b>	<b>97.5th or P95th percentile</b>
<i>Cocoa beverage</i>	187	32	149
<i>cocoa powder (100% total cocoa solids) (b)</i>	4245	560	2369

(a) data submitting for the vast majority from EURO

(b) mean from EURO is 178 µg/kg (n=2153), ASIA is 339 µg/kg (n=427) and from LAC is 1344 µg/kg (n=1268)

## **CONCLUSIONS**

17. The new data submitted to the GEMS/Food reflect a wider global distribution of occurrence data of cadmium in cocoa products compared to 2013 when JECFA77 evaluated the same products. The additional data seem to indicate a higher mean occurrence concentration for cadmium in cocoa products than previously observed by JECFA.
18. The JECFA Secretariat recommends CCCF14 to consider these preliminary observations and to take into account the new call for cadmium from all sources which has been initiated in 2020.
19. In light of the new data, the JECFA Secretariat considers it to be important to update the dietary exposure assessment of cadmium from all food sources, particularly chocolates and cocoa products and is currently putting the necessary preparatory steps in action. The updated dietary exposure assessment to cadmium from all food sources is expected to become available in 2021.