



**THE THIRD  
CODEX AND FOOD REGULATORY FORUM  
FOR NORTH AMERICA AND THE SOUTHWEST PACIFIC**

*Supporting the Enhancement of Food Control Systems in the SWP Region*

**29 – 31 March 2026**

Hilton Hotel, Denarau Island, Nadi - Fiji

# **SESSION 6**

## **DATA GENERATION AND USE IN CODEX PROCEEDINGS**

*Practical Applications*

*Related to Contaminants in*

*Food*

*Maximum Levels Setting*

***Dr. Amine Kassouf, GFoRSS***



# Outline



Definition of a “Contaminant” in Food



Risk Management Strategies of Contaminants in Food



Definition of a “Maximum Level (ML)”



Codex Alimentarius MLs Setting: Principles & Criteria



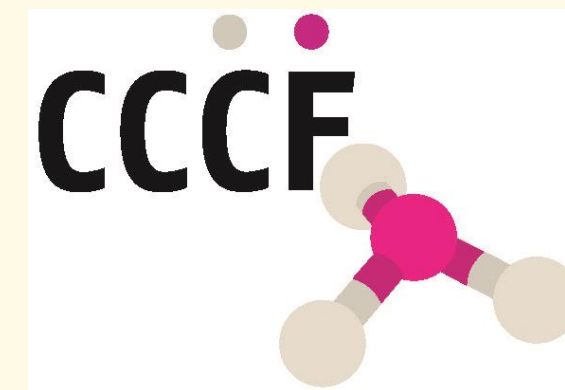
Practical Application: Management of Lead (Pb) Exposure through Spices and Herbs



# Definition of a “Contaminant” in Food

The Codex Alimentarius defines a **contaminant** as follows:

- ❑ Any substance not intentionally added to food or feed for food producing animals, which is present in such food or feed as a result of the production, manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food or feed, or as a result of environmental contamination.
- ❑ The Codex definition of a contaminant implicitly includes naturally occurring **mycotoxins and phycotoxins**.



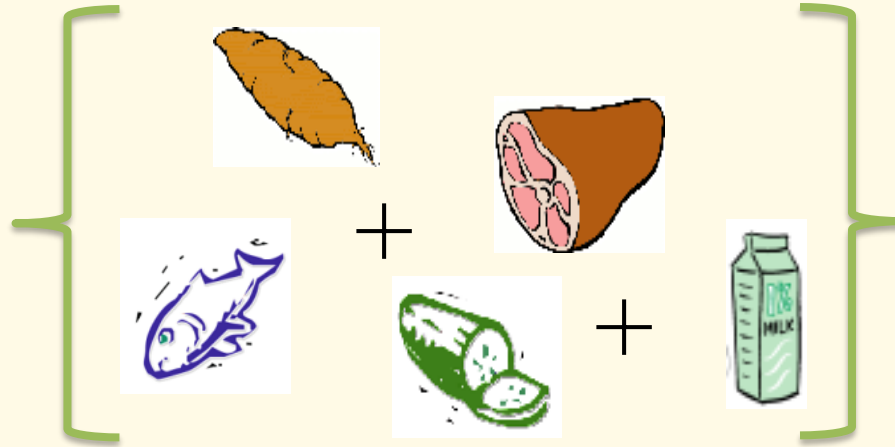
GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED  
CXS 193-1995  
Adopted in 1995.  
Revised in 1997, 2006, 2008 and 2009.  
Amended in 2010, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2021, 2022, 2023 and 2024.

# Risk Management Strategies of Contaminants in Food



1

Indications that health hazards may be involved with consumption of food that is contaminated.



2

Estimation of **Total Dietary Exposure** to the contaminant or toxin from foods/food groups.

3

Identification of foods/food groups that contribute significantly to the total dietary exposure to the contaminant.

4

Assessment of the impact of agricultural and production practices on contaminant levels in foods/food groups.

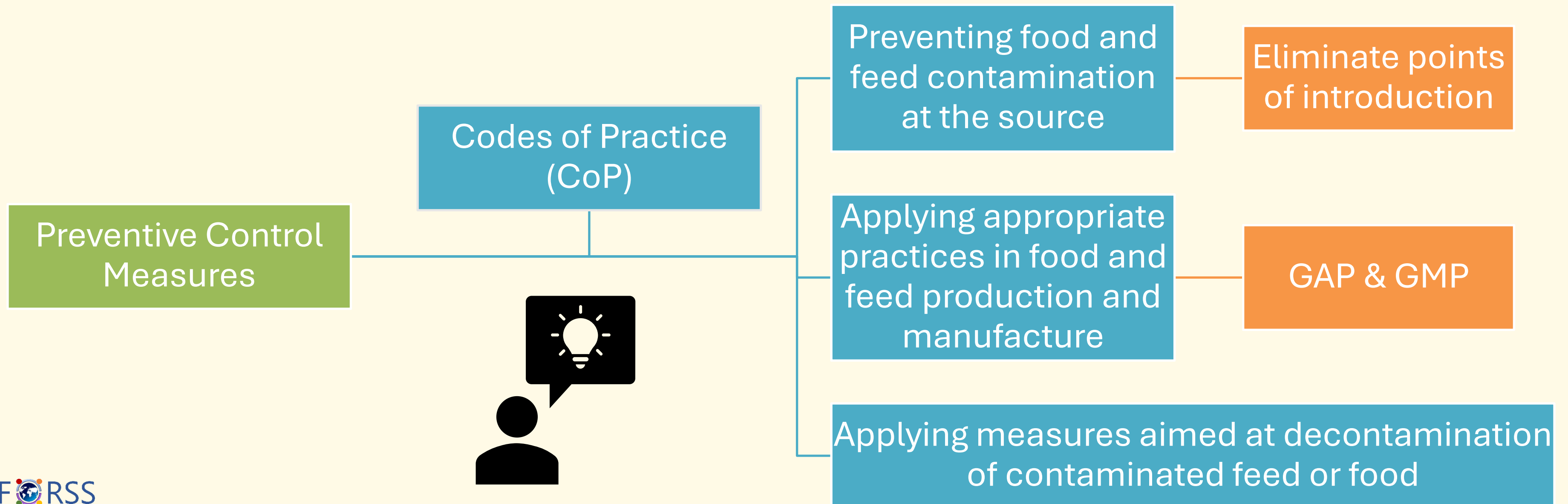
When health concerns can be substantiated, a risk management measure must be applied.



# Risk Management Strategies of Contaminants in Food

Contaminant levels in food and feed shall be **As Low As Reasonably Achievable**

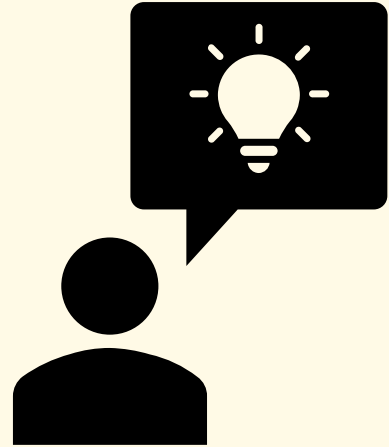
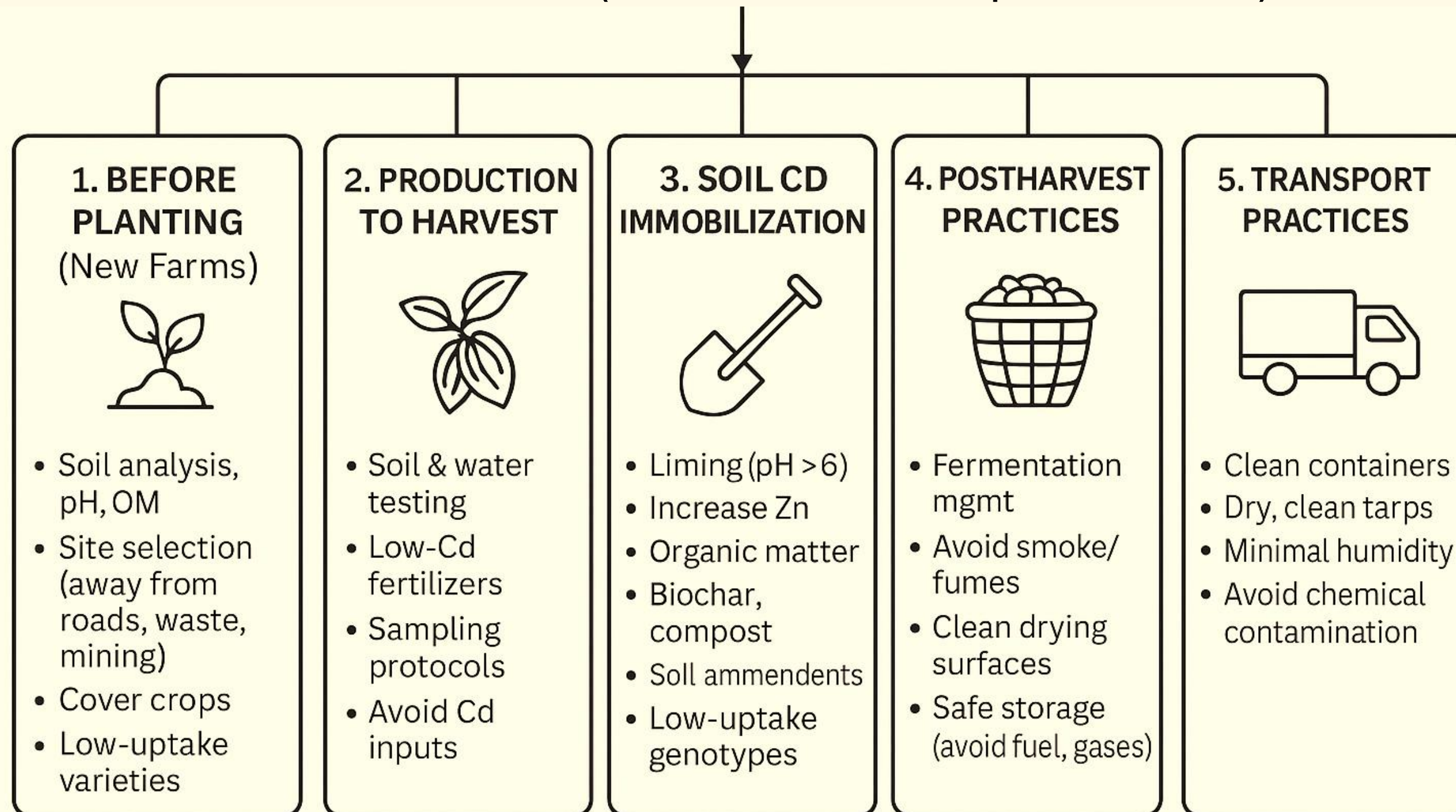
**ALARA**



# Risk Management Strategies of Contaminants in Food

## Codes of Practice (CoP)

Code of Practice for the Prevention and Reduction of Cadmium Contamination in Cocoa Beans (CXC 81-2022 adopted in 2022)





# Risk Management Strategies of Contaminants in Food

## ALARA

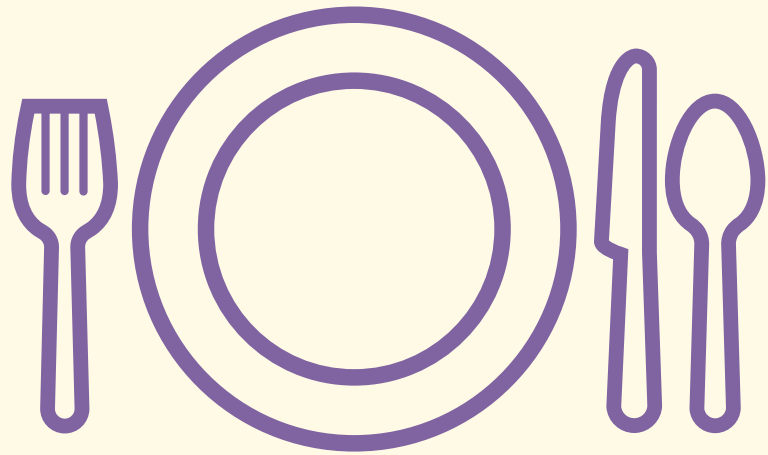
Applying measures to prevent contaminated feed or food to be marketed for consumption

## Maximum Levels (MLs)

Improve predictability at national level

Standardization at international level

Avoid the creation of unnecessary barriers to international trade



Specific advice on **dietary recommendations** may also have to be considered to complement other regulatory measures, when these measures are not adequate enough to protect public health and safety.

## Mercury in Fish - Questions and Answers

### Consumption Advice

- Why has Health Canada updated its advice pertaining to mercury in fish?
- What is the consumption advice?
- I've heard about escolar in particular in the news. What is the issue?
- The advice covers children between 1 and 11 years of age. What about infants?
- Is there consumption advice for other types of fish?
- Are there any advisories for sport fish?
- Why do advisories differ from country to country?
- How is Health Canada making Canadians aware of the updated advice?
- Can fish have more than one common name?
- Why is there specific advice for women of childbearing age and young children?
- What if I have consumed more than the recommended amounts of the fish listed in the advice?
- Why isn't salmon covered in the advice? I've heard a lot about it in the news.

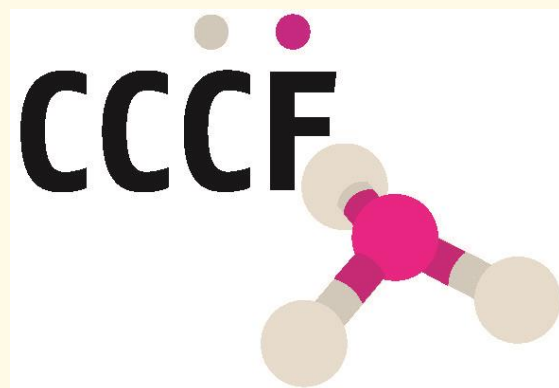
<https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/environmental-contaminants/mercury/mercury-fish-questions-answers.html>



# Definition of a “Maximum Level (ML)”

The **Maximum Level (ML)** for a contaminant in a food or feed commodity is:

- The maximum concentration of that substance recommended by the Codex Alimentarius Commission to be legally permitted in that commodity.



MLs are Codex risk-management tools derived from scientific risk assessment performed by JECFA.



*GENERAL STANDARD FOR CONTAMINANTS AND TOXINS IN FOOD AND FEED CXS 193-1995 Adopted in 1995, Revised in 2024.*



# Principles for Establishing MLs

- ❖ Maximum levels (MLs) do not need to be set for all foods that contain a contaminant or a toxin.
- ❖ MLs shall only be set for those foods in which the contaminant may be found in amounts that are **significant for the total exposure** of the consumer and known or expected to cause **problems in international trade**.
- ❖ MLs should be set in such a way that the consumer is adequately protected.
- ❖ MLs shall be based on sound scientific principles leading to ALARA levels, which are acceptable worldwide, so that there is no unjustified barrier to international trade.





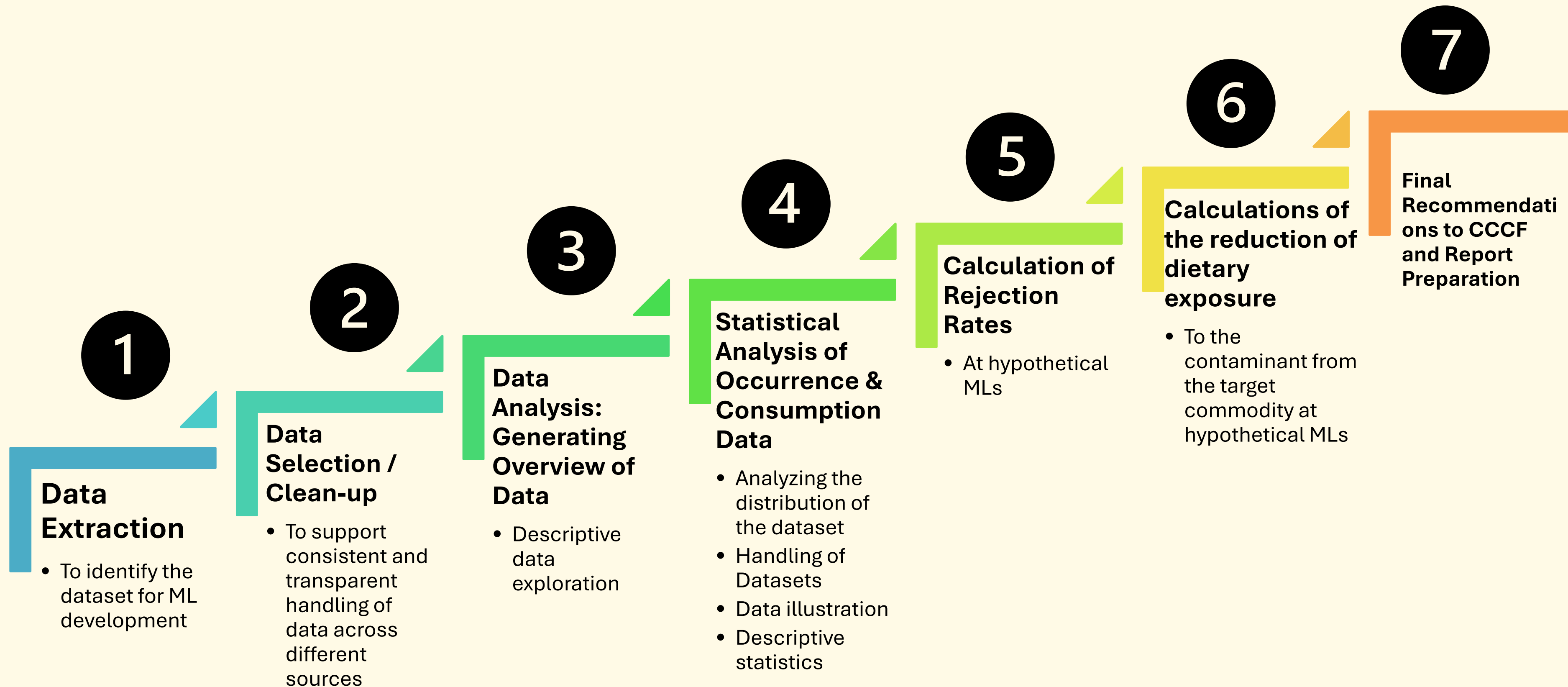
# Principles for Establishing MLs

- ❖ MLs shall only be set for those foods in which the contaminant may be found in amounts that are **significant for the total exposure** of the consumer:
  - ❖  $\geq 10\%$  of the tolerable intake (or similar health hazard endpoint) in one of the GEMS/Food consumption cluster diets, or
  - ❖  $\geq 5\%$  of the tolerable intake (or similar health hazard endpoint) in two or more of the GEMS/Food consumption cluster diets; or
  - ❖ foods or food groups that may have a significant impact on exposure for specific groups of consumers, although exposure may not exceed 5 percent of the tolerable intake (or similar health hazard endpoint) in any of the GEMS/Food consumption cluster diets.

G01	Afghanistan, Algeria, Azerbaijan, Iraq, Jord
G02	Albania, Bosnia and Herzegovina, Georgia
G03	Angola, Benin, Burundi, Cameroon, Congo
G04	Antigua and Barbuda, Bahamas, Barbados
G05	Argentina, Bolivia Plurinational State of, E
G06	Armenia, Cuba, Egypt, Greece, Iran Islamic
G07	Australia, Bermuda, Finland, France, Icelan
G08	Austria, Germany, Poland, Spain
G09	Bangladesh, Cambodia, China, Democratic
G10	Belarus, Bulgaria, Canada, Croatia, Cyprus,
G11	Belgium, Netherlands
G12	Belize, Dominica
G14	Comoros, Fiji Islands, Kiribati, Papua New
G13	Ethiopia, Erythrea, South Sudan, Botswana
G16	Gabon, Rwanda, Uganda
G17	Samoa, Sao Tome and Principe
G15	Serbia, Czech Republic, Denmark, Hungary

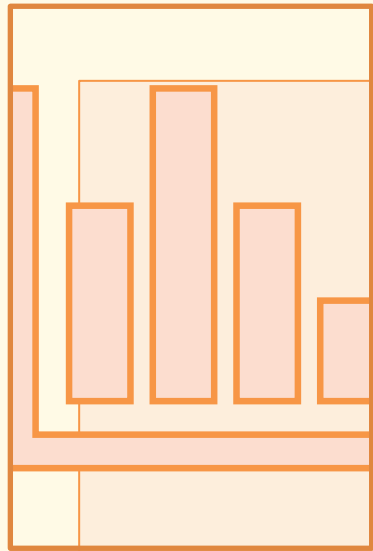


# Development of MLs in Codex





# Development of MLs – Data Requirements

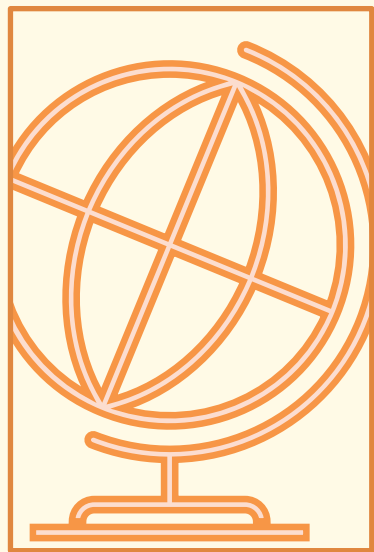


The management of data plays a key role in the work of elaborating MLs, and it is crucial to have data of good quality.

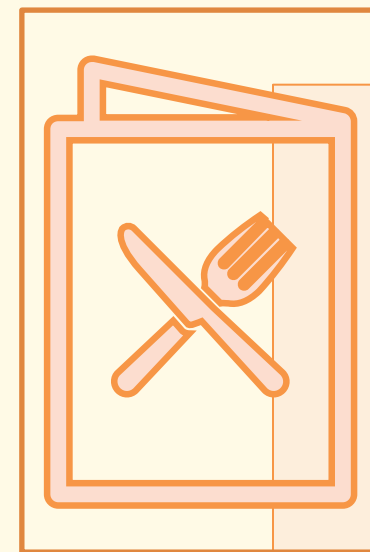


**Occurrence data** should ideally be obtained through statistically based sampling, and analysis should be conducted using validated methods with appropriate LOQ and LOD in laboratories that have quality assurance systems.

*Monitoring data vs Total Diet Study (TDS)*



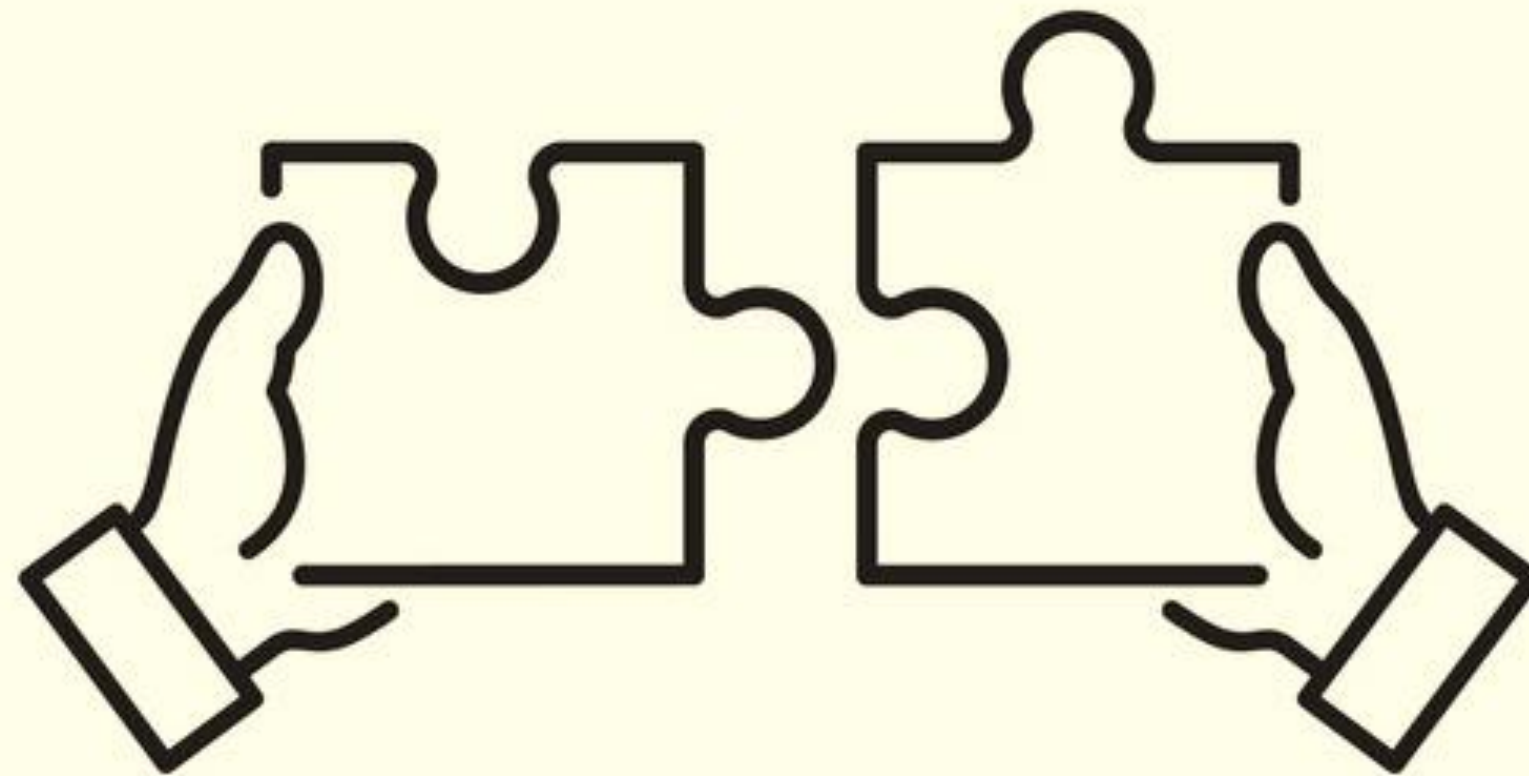
Ideally, data submitted by member countries should be nationally representative (geographical representativeness)



**Consumption data** should ideally be individual-based: 24h dietary recall, FFQ, etc. An interesting approach: Households Expenditure Surveys.



# Development of MLs in Codex



Assessment of the dietary intake in relation to the proposed or existing MLs and the toxicological reference value

Rejection rates (%) not to exceed an agreed on % level



# Exposure Scenarios to Lead (Pb) from Spice Mixtures

*This exercise is based on an excerpt of Codex document – CX/CF 25/18/18. The entire document is provided for your reference.*

## Data Extraction, Selection & Clean-up

1

- **A Total of 14805 data points** were found in the **GEMS Food Database** corresponding to occurrence values for Pb in food commodities labelled as “herbs, spices and condiments.

2

- **5,250 data points** were selected, reflecting **generic food names** potentially describing spice mixtures (due to the lack of specificity in the GEMS/Food naming system), and excluding all data points that reflect clearly identified individual spices.

**CODEX ALIMENTARIUS COMMISSION** **E**  
Food and Agriculture Organization of the United Nations | World Health Organization  
Viale delle Terme di Caracalla, 00153 Rome, Italy - Tel: (+39) 06 57051 - E-mail: codex@fao.org - www.codexalimentarius.org  
Agenda item 17 | CX/CF 25/18/18 | May 2025

**JOINT FAO/WHO FOOD STANDARDS PROGRAMME**  
**CODEX COMMITTEE ON CONTAMINANTS IN FOODS**  
Eighteenth Session  
23-27 June 2025  
Bangkok, Thailand

**ANALYSIS OF THE OCCURRENCE DATA OF LEAD IN SPICE MIXTURES**  
(Prepared by the FAO/WHO JECFA Secretariat)

**BACKGROUND**

1. Noting the absence of maximum levels (MLs) for lead in spice mixtures in the *General standard for contaminants in food and feed* (CXS 193-1995) (GSCFF), the 17th Session of the Codex Committee on Contaminants in Foods (CCCF17, 20224) considered a discussion paper prepared by Brazil, as Chair of the Electronic Working Group (EWG), on maximum levels (MLs) for lead in certain food categories, including spices.
2. CCCF17 noted that the EWG and the virtual meeting of the WG that took place before CCCF17 (VWG) had not proposed ML(s) for a spice mixture, as CXS 193 did not establish levels for multi-ingredient products. It was possible to obtain MLs considering the percentage of specific ingredients in the mixture. Additionally, the contamination profiles varied between spice mixtures, depending on the ingredients. This discussion became more evident when the Committee considered an ML of 0.9 mg/kg for spices, dried seeds, excluding dried celery seeds.<sup>1</sup>
3. CCCF17 noted that the Codex Secretariat could issue a circular letter (CL) requesting comments on the necessity and content of further guidance for multi-ingredient products. The CL would include a sample calculation reflecting the proposal to include ingredients without Codex ML and a mixture where the proportion of ingredients is unknown. Following this recommendation, the Codex Secretariat issued CL 2024/03-CF<sup>2</sup> requesting comments on the application of MLs to multi-ingredient products. The replies to this CL have been compiled in CX/CF 25/18/17<sup>3</sup>.
4. CCCF17 also agreed to request the Secretariat of the Joint FAO/WHO Expert Committee on Food Additives (JECFA) to review the data in the GEMS/Food database already available on products labelled as spice mixtures and present an analysis of the data for discussion at CCCF18. Such an analysis would determine the concentration range of lead in spice mixtures and enable further understanding of such mixtures.<sup>4</sup>
5. The 47th Session of the Codex Alimentarius Commission (CAC47, 2024) adopted several MLs for spices, including dried seeds (excluding celery seeds) as proposed by CCCF17.<sup>5</sup>

**OCCURRENCE DATA**  
Data retrieved from the **Global Environment Monitoring System - Food Contamination Monitoring and Assessment Programme (GEMS/Food database)**

6. The JECFA Secretariat retrieved through the GEMS/Food database, 14,805 results from declared randomly collected samples from the broad food category 'herbs, spices, and condiments, covering 45 distinct food items. To avoid introducing confounding bias in data interpretation, this discussion paper focuses on six food categories, potentially including spice mixtures due to the lack of specificity in the GEMS/Food naming system. These categories represent a total of 5,250 data points, listed below in order of frequency:

<sup>1</sup> REP14/CF17, paras. 28-31, Appendix II  
<sup>2</sup> <https://www.fao.org/fao-who-codexalimentarius/resources/circular-letters/en/>  
<https://www.fao.org/fao-who-codexalimentarius/committees/committee/related-circular-letters/en/?committee=CCCF>  
<sup>3</sup> <https://www.fao.org/fao-who-codexalimentarius/meetings/detail/hu?meeting=CCCF&session=18>  
<sup>4</sup> REP24/CF, paras. 28 and 30  
<sup>5</sup> REP24/CAC47, paras. 03-07, Appendix II

## 3

### Data Analysis: Generating Overview of Data

- **Time Period Covered:** the sampling period ranged from 2014 to 2024 (10 years), which can be regarded as a reasonably representative time period, capturing any potential implementation of regulatory measures (e.g., Codes of Practice) aimed at mitigating lead contamination.
- **Geographical Coverage:** Broad geographical representation, covering 12 countries and the European Union, including key producing and consuming member countries.

# Exposure Scenarios to Lead (Pb) from Spice Mixtures

## 4 Statistical Analysis of Occurrence & Consumption Data

GEMS Food Name	GEMS Food Code	Data points	Non Detected (%)	Lead concentration 5 <sup>th</sup> Percentile (mg/kg)	Lead concentration 50 <sup>th</sup> Percentile (mg/kg)	Mean lead concentration (mg/kg)	Lead concentration 75 <sup>th</sup> Percentile (mg/kg)	Lead concentration 95 <sup>th</sup> Percentile (mg/kg)	Lead concentration 97.5 <sup>th</sup> Percentile (mg/kg)	Maximum lead concentration (mg/kg)
Spices, Roots and Rhizomes	HS 0193	169	5	0.01	0.20	0.59	0.36	2.18	5.98	11.20
Herb, spice or condiment NES	A.16	1348	71	0.00	0.02	0.56	0.08	0.32	0.52	543.00
HERBS	HH 0092	1925	17	0.01	0.11	0.86	0.26	1.31	1.78	350.00
SPICES	HS 0093	1293	20	0.03	0.21	0.42	0.39	1.50	2.50	11.00
Spices, Seeds	HS 0190	17	59	0.01	0.02	0.06	0.02	0.15	0.20	0.25
Spices, Fruits and Berries	HS 0191	498	11	0.02	0.24	0.26	0.38	0.58	0.60	2.58
Selection of Herbs, spices and condiments	6 codes above	5250	31	0.00	0.11	0.60	0.29	1.03	1.67	543.00

	Mean Consumption (g/day)	P95 Consumption (g/day)
Children (20 kg)	3.8	10.4
Adults (84 kg)	5.3	11.0



# Exposure Scenarios to Lead (Pb) from Spice Mixtures

**5**

## Calculation of Rejection Rates

- At hypothetical MLs

ML Scenario	Mean Pb Concentration (mg/kg)	Rejection Rate (%)	Comment
No ML	0.60	0	?
ML: 2 mg/kg	0.21	1.9	?
ML: 1 mg/kg	0.17	5.1	?

# Exposure Scenarios to Lead (Pb) from Spice Mixtures

6

## Calculations of the reduction of dietary exposure

- To the contaminant from the target commodity at hypothetical MLs

ML scenario (Children)	% PoD (Mean)	% PoD (High)	% Reduction (Mean)	% Reduction (High)
No ML	19	52	-	-
ML: 2 mg/kg	7	18	63.6	64.5
ML: 1 mg/kg	5	15	72.7	70.9

ML scenario (Adults)	% PoD (Mean)	% PoD (High)	% Reduction (Mean)	% Reduction (High)
No ML	3	6	0	0
ML: 2 mg/kg	1	2	75	62.5
ML: 1 mg/kg	1	1.5	75	75



# Conclusion

✓ **Data is the foundation**

*Without reliable and representative datasets, risk management decisions remain uncertain.*

✓ **Codex MLs are global benchmarks but may require national adaptation**

*Countries may need to refine MLs when unique consumption patterns or exposure sources exceed global averages.*

✓ **Codes of Practice are equally important as MLs**

*Preventing contamination at source often provides more sustainable protection than adopting or lowering MLs alone.*

✓ **Risk management is a balance**

*Effective measures must protect health while ensuring feasibility for producers and fairness in international trade.*

