

# **Reports on tasks for scientific cooperation**

**Report of experts participating in Task 3.2.11 (抜粹)**

**March 2004**

**Assessment of the dietary exposure  
to arsenic, cadmium, lead and mercury  
of the population of the EU Member States**

Directorate-General Health and Consumer Protection

CONTENT	PAGE	
<b>1 FOREWORD</b>	4	
1.1 SUMMARY	5	
1.2 INTRODUCTION	8	
1.3 LEGISLATION	9	
1.4 ESTIMATION OF FOOD CONSUMPTION	10	
1.5 DIETARY INTAKE OF ELEMENTS	10	
1.6 EVALUATION OF THE RESULTS	11	
1.7 LIMITINGS FACTORS	12	
1.8 CONCLUSIONS FROM SCOOP – TASK 3.2.11	13	
1.9 PARTICIPANTS	16	
1.10 GLOSSARY	20	
<b>2. Dietary intake of arsenic</b>	<b>21</b>	(略)
2.1 Toxicology	21	
2.2 Recommendations on intake limitations	21	
2.3 Intake of arsenic by the mean adult population	21	
2.4 Intake of arsenic by children: Mean population	23	
2.5 Legislation	23	
2.6 Comments on the mean adult population intake of arsenic by Member State	24	
2.7 Comments on arsenic in specific food groups	27	
2.8 Estimated daily intake by other population groups	31	
2.9 Occurrence summary table for arsenic	33	
<b>3. Dietary intake of cadmium</b>	<b>37</b>	(略)
3.1 Toxicology	37	
3.2 Recommendations on intake limitations	37	
3.3 Intake of cadmium by the mean adult population	38	
3.4 Intake of cadmium by children: Mean population	40	
3.5 Legislation	40	
3.6 Comments on the mean adult population intake of cadmium by Member State	41	
3.7 Comments on cadmium in specific food groups	45	
3.8 Estimated daily intake by other population groups	56	
3.9 Occurrence summary table for cadmium	59	
<b>4. Dietary intake of lead</b>	<b>71</b>	(略)
4.1 Toxicology	71	
4.2 Recommendations on intake limitations	71	
4.3 Intake of lead by the mean adult population	72	

SCOOP 3.2.11 – Intake of As, Cd, Pb and Hg

4.4 Intake of lead by children: Mean population	74
4.5 Legislation	75
4.6 Comments on the mean adult population intake of lead by Member State	76
4.7 Comments on lead in specific food groups	79
4.8 Estimated daily intake by other population groups	87
4.9 Occurrence summary table for lead	89
<b>5. Dietary intake of mercury</b>	<b>95</b>
5.1 Toxicology	95
5.2 Recommendations on intake limitations	95
5.3 Intake of mercury by the mean adult population	96
5.4 Intake of mercury by children: Mean population	98
5.5 Legislation	99
5.6 Comments on the mean adult population intake of total mercury by Member State	99
5.7 Comments on mercury in specific food groups	103
5.8 Estimated daily intake by other population groups	110
5.9 Occurrence summary table for mercury	113
<b>6. Food categorisation system</b>	<b>121</b>
<b>Annex A: Summary of Submissions and References</b>	
<b>Annex B: Occurrence Data, Consumption Data and Intake Data</b>	

(略)

## **1. FOREWORD**

According to Council Directive 93/5/EEC "on the assistance to the Commission and cooperation by the Member States in the scientific examination of questions relating to food" Member States of the European Union can cooperate on problems facing the Commission in the area of food. Directive 93/5/EEC also indicates that an inventory of Tasks to be undertaken has to be published as a Commission Decision at least every six months. For each Task, the participating Member States, the Member State which provides coordination and time limit for completion will be indicated. The rationale for each Task is to provide harmonised and reliable information to be used by the Commission for the management of problems related to food. With this aim the Competent Authorities responsible for Scientific Cooperation in the Member States nominate experts in the specific field of interest that will provide the Coordinator with the information necessary to prepare a final report. In principle the final report should contain factual information, but it should be underlined that gathering and presenting scientific data, especially deriving from sources of different origin, can require a degree of interpretation by experts and by the Coordinators. It is therefore important to stress that the interpretation and views in the present report are not necessarily those of the participating Member States or those of the European Commission.

## 1.1 Summary

Data on occurrence, consumption and intake calculations for the mean adult population were submitted by BE, DK, FI, FR, DE, HE, IR, IT, NL, NO, PT, SE and UK. Several factors have an impact on the validity of the intake estimation. The most important is probably the limited amount of occurrence data, which in many countries left several food groups empty. DK and UK had sufficient data for a complete intake assessment. Other confounding factors are differences in analytical quality and different choices of age groups for the intake estimations. The results therefore have to be viewed with caution.

The occurrence levels of Cd, Pb and Hg in foodstuffs, for which maximum limits (ML) have been established in Commission Regulation 466/2001, are generally well below the MLs.

**Arsenic.** Nine Member States submitted occurrence and intake data for arsenic in fish, the main source of arsenic in the food, for the mean adult population. Very few data was provided on arsenic in other foodstuffs. An accurate estimation of the total intake is therefore not possible in most Member States. The results from DK and the UK, which cover all major food groups, indicate that fish and other seafood contribute more than 50% of the dietary arsenic. The mean daily intake of arsenic from fish and other seafood is below 0.35 mg. It is thus assumed that the total daily intake of arsenic by the mean adult population is below 1 mg. Consumers of fish and seafood may reach an intake of 1 mg/day from these foods alone.

Data from FR and DE indicate that children have a lower intake of arsenic than adults. The burden/kg bodyweight of children may, however, be larger than for adults due to their lower bodyweight.

The type of water in which the fish is caught, i.e. marine or fresh, is of major importance for the As-content, with the highest levels in marine species. No data was available on the inorganic arsenic-species, which are the most toxic species present in food. The ratio inorganic/total As in foodstuffs is thus largely unknown.

**Cadmium.** Thirteen Member States submitted occurrence and intake data for the mean adult population. DK, FI, FR, DE and the UK had the best data to make an accurate intake estimation. IR had data for only two food categories. The mean intake in the Member States is less than 30% of the PTWI, with the exception of the Netherlands with 38%. The PTWI is 0.49 mg for a person weighing 70 kg. In the UK the intake by mean consumers is 22% of the PTWI, whereas for high consumers is 37% of the PTWI. Cereals and vegetables are the main sources of cadmium in the diet, representing approximately 2/3 of the mean cadmium intake.

Data from FR and DE indicate that children have a lower intake of cadmium than adults. However, children have a larger burden/kg body weight, due to their lower body weight. The cadmium dietary intake of children 4-6 years old is estimated to 65% of the PTWI.

**Lead.** Twelve Member States submitted occurrence and intake data for the mean adult population. Only DK and the UK had sufficient data to make a complete intake estimation. All other Member States were lacking data from one or several food groups. The results indicate,

however, that in 11 Member States the average intake of lead via food by is less than 25% of the PTWI, which is 0.025 mg/kg bodyweight/week (equal to 1.75 mg for a person weighing 70 kg). In PT the intake was in the order of 50% of the PTWI. This high intake is due to certain food groups which were reported to contain unusually high lead levels. In PT these foods, e.g. potatoes, were analysed with methods with extremely high detection limits ( $\leq 1$  mg/kg). Since half of that limit is used as the occurrence level for the intake calculation, intake may erroneously appear to be very high. In e.g. IR the intake is underestimated (0.4% of the PTWI) since occurrence data were available only from a few food items.

The mean intake in the Member States is 14% of the PTWI. In the UK the intake by the mean population is 11% of the PTWI, whereas the intake by mean consumers is 24% and for high level consumers 43% .

Specific foodstuffs from some Member States were reported to contain very high lead levels (wine, game, fish and meat). If these high occurrence levels are confirmed, or the sampling found to be representative, consumers in these Member States may be at risk of exceeding the PTWI.

Data from FR and DE indicate that children have a lower intake of lead than adults. However, children have a larger burden/kg body weight, due to their lower body weight, and may reach 35 % of the PTWI.

**Mercury.** Thirteen Member States submitted occurrence and intake data for fish. DK, DE and the UK had the best data to make an accurate intake estimation. FI, IT and SE had data for only one food category. Fish is the main source of mercury in the food, for the mean adult population. In fish and shellfish, mercury is present mainly in the form of methylmercury, while its almost entirely inorganic mercury in other foodstuffs. Fruits and vegetables are the main source of mercury in FR, NL and DE. In FR and DE mushrooms is included in this category, which strongly affects the intake level. Dried fruit and vegetables also has an enhancing effect on the intake in DE.

The mean intake for the Member States is less than 30% of the PTWI for total mercury, corresponding to 0.35 mg for a person weighing 70 kg. In the UK the intake by mean consumers is 6% of the PTWI, whereas for high consumers is 13% of the PTWI.

The current PTWI (established 2003) for methylmercury is 1.6  $\mu$ g/kg bodyweight, which corresponds to 0.112 mg/week for a person weighing 70 kg. Data were reported for total mercury, but as an overestimate assuming this was all methylmercury, the mean intake of methylmercury from fish and shellfish in the Member States would be less than 30% of the PTWI for methylmercury. In the UK the methylmercury intake by mean consumers would be 13% of the PTWI, whereas for high consumers it would be 41% of the PTWI for methylmercury. In NO the methylmercury intake by mean consumers would correspond to 78% of the PTWI for methylmercury, whereas for high consumers, the PTWI for methylmercury would be exceeded.

### SCOOP 3.2.11 – Intake of As, Cd, Pb and Hg

Data from FR and DE indicate that children have a lower intake of mercury than adults. However, children have a larger burden/kg body weight due to their lower body weight. Depending upon the proportions of methylmercury present in the foods tested for total mercury, it is possible that the intake could exceed the PTWI for methylmercury .

The results from the SCOOP task indicate that there is a risk that population-groups with a high consumption of fish and seafood may have intakes of methylmercury that are close or even exceed the PTWI for methylmercury of 1.6  $\mu\text{g}/\text{kg}$  body weight/week. More information is needed on the relative proportions of methylmercury to total mercury in different foods.