

**TOX/2016/12**

## **COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT**

### **Review of potential risks from acrylamide in the diet of infants aged 0 to 12 months and children aged 1 to 5 years**

#### **Introduction**

1. The Scientific Advisory Committee on Nutrition (SACN) is undertaking a review of scientific evidence that will influence the Government's dietary recommendations for infants and young children. The SACN is examining the nutritional basis of the advice. The Committee on Toxicity in Food, Consumer Products and the Environment (COT) was asked to review the risks of toxicity from chemicals in the diet of infants, most of which has been completed, and young children. The reviews will identify new evidence that has emerged since the Government's recommendations were formulated, and will appraise that evidence to determine whether the advice should be revised. The recommendations cover diet from birth to age five years.
2. There are currently no Government dietary recommendations for infants and young children relating to acrylamide. However, Commission Recommendation 2013/647/EU on investigations into levels of acrylamide in food, specifies Indicative Values and groups of foodstuff to which they apply. Indicative values are not statutory maximum limits and are intended only as a guide to prompt investigation of higher levels to understand how to reduce levels of acrylamide in food. The Indicative Values are to be kept under regular review.
3. In 2014, the European Food Safety Authority (EFSA) issued a draft scientific opinion on the risks to public health related to the presence of acrylamide in food. The COT and Committee on Carcinogenicity (COC) responded to the consultation, noting that there were broadly in agreement with the conclusions and making proposals for clarifications<sup>1</sup>. The finalised EFSA opinion was published in June 2015 (EFSA, 2015).
4. This discussion paper provides estimated acrylamide exposures for infants aged 0 to 12 months and young children aged 1 to 5 years in the UK.

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<sup>1</sup> <http://cot.food.gov.uk/sites/default/files/tox2014-36.pdf>

## **Background**

5. Acrylamide forms in starchy food products during high-temperature cooking, including frying, baking, roasting and also industrial processing, at +120°C and low moisture. It was first detected in foods in April 2002 although it is likely that it has been present in food since cooking began. Acrylamide also has non-food industrial uses, particularly as polyacrylamide, and is present in tobacco smoke.

6. The key toxicological effects of acrylamide are genotoxicity, carcinogenicity, neurotoxicity and reproductive toxicity. EFSA (2015) concluded that the human data were not sufficient to be used in dose response assessment. Therefore benchmark dose lower confidence limits (BMDLs) were calculated from the results of studies in rodents, and used in assessing margins of exposure (MOEs).

7. For the carcinogenicity of acrylamide, EFSA calculated a BMDL<sub>10</sub> (at which there is a 10% increase in incidence of tumours) of 0.17 mg/kg body weight (bw)/day. For effects on the nervous system, EFSA calculated a BMDL<sub>10</sub> of 0.43 mg/kg bw/day, and concluded that other effects, such as on the reproductive system would only occur at higher doses. Therefore the BMDL<sub>10</sub> of 0.43 mg/kg body weight/day was used as a reference point for the non-cancer effects of acrylamide. The reproductive toxicity of acrylamide is unlikely to be relevant for the age groups considered in this paper.

## **Acrylamide exposures in infants aged 0 to 12 months and young children aged 1 to 5 years**

### ***Sources of acrylamide exposure***

#### *Human milk*

8. A literature search has not identified any data on acrylamide concentrations in breast milk in the UK. EFSA (2015) reported that acrylamide is transferred to a small extent into breast milk but did not appear to use specific data in estimating exposure via this route. Sörgel et al. (2002) measured acrylamide in breastmilk of two mothers who consumed potato chips (i.e. potato crisps) containing about 1 mg of acrylamide (approximately 15 µg/kg bw). Whilst pre-dose levels of acrylamide were below the limit of quantification (LOQ) of 2.00 µg/L in the breastmilk of these mothers, it was detected between 3 and 8 hours after the meal. The lowest concentration of acrylamide observed in their breastmilk was 3.17 µg/L, after eight hours and the highest concentration was 18.8 µg/L, after four hours of consumption. In 14 individual and 4 pooled breastmilk samples from non-smoking Swedish mothers exposed to dietary acrylamide equivalent to about 0.5 µg/kg bw, the concentration of AA was below the LOQ of 0.5 µg/kg, except in one individual sample (0.51 µg/kg) (Fohgelberg et al., 2005).

#### *Food*

## UK 2014 Total Diet Study (TDS)

9. The concentration of acrylamide was measured in the UK 2014 Total Diet Study (TDS). The TDS consisted of selecting foods from 24 UK towns based on food consumption data, preparation of the food as consumed and subsequent pooling of related foods into 27 food groups before analysing the composite samples. The TDS did not include samples of infant formulae or commercially available infant foods.

10. The concentrations of acrylamide in the samples of the 2014 TDS are reported in Table 1. The highest concentrations of acrylamide were in the snacks, potatoes and miscellaneous cereals groups.

Table 1. Acrylamide concentration in the 2014 TDS food groups

| FOOD GROUP                 | ACRYLAMIDE<br>CONCENTRATION |
|----------------------------|-----------------------------|
|                            | µg/kg                       |
| Alcoholic drinks           | 6.3                         |
| Bottled Waters*            | <0.008                      |
| Bread                      | 15.6                        |
| Canned Vegetables          | 12.2                        |
| Carcase Meat <sup>†</sup>  | <3.0                        |
| Condiments                 | 21.5                        |
| Dairy Products             | 9.1                         |
| Desserts                   | 20.1                        |
| Eggs                       | 3.1                         |
| Fish                       | 8.7                         |
| Fresh Fruit                | 6.2                         |
| Fruit Products             | 6.5                         |
| Green Vegetables           | 7.7                         |
| Meat Products              | 16.9                        |
| Meat substitutes           | 13.7                        |
| Milk                       | 1.0                         |
| Miscellaneous Cereals      | 65.3                        |
| Non-alcoholic Beverages    | 6.2                         |
| Nuts                       | 25.0                        |
| Offals                     | 15.8                        |
| Oils and Fats <sup>†</sup> | <3.0                        |
| Other Vegetables           | 21.5                        |
| Potatoes                   | 180.6                       |
| Poultry                    | 6.6                         |
| Snacks                     | 360.3                       |
| Sugars and Preserves       | 20.3                        |
| Tap Water                  | 0.0                         |

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\*Levels were below the LOD of 0.008 µg/L.

+Levels were below the LOQ of 3.0 µg/kg .

## EFSA

11. EFSA (2015) evaluated a total of 43 419 analytical results from food commodities collected and analysed since 2010 and reported by 24 European countries including the UK. Unlike the UK 2014 TDS, the food items considered by EFSA in their exposure assessment included occurrence data on some infant foods which were supplied by the UK and other European countries. However, the monitoring data supplied by the UK to EFSA for baby foods did not include data for infant formula. Of the data on infant formula submitted to EFSA by other Member States, 97% were affected by left censoring, i.e. the values were below the LOQ or limit of detection (LOD).

12. EFSA (2015) reported that drinking water treated with polyacrylamides as flocculants can contain residual acrylamide and the use of acrylamide as a grouting agent can cause the contamination of ground water and soil. However, acrylamide is not considered to be highly persistent in the environment. Available data indicates that concentrations of acrylamide in the atmosphere are very low, and when present, its low vapour pressure makes it unlikely that acrylamide will be transported in the atmosphere. Therefore exposures of UK infants and young children aged 12 to 60 months, from soil, water and air as additional potential sources of acrylamide exposure have not been estimated. Additional exposure could potentially arise from environmental tobacco smoke.

### **Exposure assessment**

13. Consumption data from the Diet and Nutrition Survey of Infants and Young Children (DNSIYC) (DH, 2013), and from years 1-4 of the National Diet and Nutrition Survey Rolling Programme (NDNS) (Bates et al., 2014) have been used for the estimation of dietary exposures. Bodyweight data used in the estimation of exposures are shown in Table 2 below. Exposure estimates based on data from the 2014 TDS are presented only as upper bounds, because the few food groups with concentrations below the LOQ or LOD (see Table 1) had a minimal impact on the total dietary exposure.

Table 2. Average bodyweights used in the exposure estimations (DH, 2013; Bates *et al.*, 2014)

| <b>Age group (months)</b> | <b>Bodyweight (kg)</b> |
|---------------------------|------------------------|
| 0 to <4                   | 5.9                    |
| >4 to <6                  | 7.8                    |
| >6 to <9                  | 8.7                    |

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|            |      |
|------------|------|
| >9 to <12  | 9.6  |
| >12 to <15 | 10.6 |
| >15 to <18 | 11.2 |
| >18 to <24 | 12.0 |
| >24 to <60 | 16.1 |

#### Exposure from breast milk

14. Whilst there are insufficient data on representative levels of acrylamide in breast milk, the LOQ (2.0 ng/ml) from the study of Sörgel et al. (2002) could be used in an upper bound (UB) approach to estimate possible exposure. This approach indicates that exposure in exclusively breastfed infants is likely to be less than 0.4 µg/kg bw/day (Table 3).

Table 3. Estimated upper bound acrylamide exposure from exclusive breastfeeding in 0 to 6 month old infants, estimated for average and high level consumption of breast milk.

| Acrylamide concentration (µg/L) | Exposure (µg/kg bw/day)       |                 |                             |                 |
|---------------------------------|-------------------------------|-----------------|-----------------------------|-----------------|
|                                 | Average consumer (800 mL/day) |                 | High consumer (1200 mL/day) |                 |
|                                 | 0 to <4 months                | >4 to <6 months | 0 to <4 months              | >4 to <6 months |
| 2.0                             | 0.27                          | 0.21            | 0.41                        | 0.31            |

#### *Exposure from infant formula and food*

##### Exclusive infant formula feeding

15. Exposure estimates for this category were derived using occurrence data reported in EFSA (2015). Mean lower-bound (LB) and UB concentrations of 3 µg/kg and 26 µg/kg, respectively, reported by other European countries for dry formula were used for estimation of exposure for 0 to 6 month old infants exclusively fed infant formula. These concentrations reported for dry formula were equivalent to 0.45 µg/L and 3.9 µg/L respectively after reconstitution, based on the assumption that ready-to-drink infant formula contains 15% dry formula (Table 4). Exposure to acrylamide ranged from 0.046 to 0.793 µg/kg bw/day.

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Table 4. Acrylamide exposure ( $\mu\text{g}/\text{kg}$  bw/day) from exclusive infant formula feeding.

| Exposure (LB-UB range)<br>( $\mu\text{g}/\text{kg}$ bw/day) |                             |                                |                             |
|---|-----------------------------|--------------------------------|-----------------------------|
| Average consumer<br>(800 mL/day)                            |                             | High consumer<br>(1200 mL/day) |                             |
| 0 to 4 <sup>a</sup> months                                  | >4 to 6 <sup>a</sup> months | 0 to 4 <sup>a</sup> months     | >4 to 6 <sup>a</sup> months |
| 0.061 - 0.529   | 0.046 - 0.400               | 0.092 - 0.793                  | 0.069 - 0.600               |

<sup>a</sup> Mean and high level exposures were based on exclusive breastfeeding and consumption of 800 and 1,200mL, respectively (COT, 2013).

#### Dietary exposure estimates

16. Table 5 summarises the total dietary exposure to acrylamide estimated for infants. The total mean and 97.5<sup>th</sup> percentile exposures to acrylamide from a combination of all food groups in the 2014 TDS ranged from 0.594-1.21 and 2.08-3.14  $\mu\text{g}/\text{kg}$  bw/day, respectively.

Table 5. Estimated dietary acrylamide exposures in infants aged 4 to 12 months

| Acrylamide ( $\mu\text{g}/\text{kg}$ bw/day) |                               |                          |                               |                           |                               |
|--|-------------------------------|--------------------------|-------------------------------|---------------------------|-------------------------------|
| 4 to 5.99 months (n=116)                     |                               | 6 to 8.99 months (n=606) |                               | 9 to 11.99 months (n=686) |                               |
| Mean   | 97.5 <sup>th</sup> percentile | Mean                     | 97.5 <sup>th</sup> percentile | Mean                      | 97.5 <sup>th</sup> percentile |
| 0.594  | 2.08                          | 0.911                    | 2.70                          | 1.21                      | 3.14                          |

17. The groups that made the highest contribution to total mean exposure were in the order dairy products > potatoes > other vegetables > miscellaneous cereals for 4 to 6 month old infants; potato > dairy products > miscellaneous cereals > other vegetables for 6 to 9 month old infants and potatoes > miscellaneous cereals > dairy products > other vegetables for 9 to 12 month old infants (see Annex A).

#### Children age 1 to 5 years

18. Table 6 summarises total dietary exposure to acrylamide estimated for young children aged 1 to 5 years. The total mean and 97.5<sup>th</sup> percentile exposures to acrylamide from a combination of all food groups in the 2014 TDS ranged from 1.50 -1.70  $\mu\text{g}/\text{kg}$  bw/day to 2.75-3.69  $\mu\text{g}/\text{kg}$  bw/day, respectively. The groups that made the highest contribution to total mean

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exposure were in the order potatoes > miscellaneous cereals > non-alcoholic beverages > snacks for all age groups.

Table 6. Estimated dietary acrylamide exposures in young children aged 1 to 5 years

| Acrylamide Range ( $\mu\text{g}/\text{kg bw}/\text{day}$ ) |                                  |                            |                                  |                    |                                  |                   |                                  |
|--|----------------------------------|----------------------------|----------------------------------|--------------------|----------------------------------|-------------------|----------------------------------|
| 12 to 14.99 months<br>(n=670)                              |                                  | 15 to 18 months<br>(n=605) |                                  | 1.5-2 years (n=70) |                                  | 2-5 years (n=429) |                                  |
| Mean   | 97.5 <sup>th</sup><br>percentile | Mean                       | 97.5 <sup>th</sup><br>percentile | Mean               | 97.5 <sup>th</sup><br>percentile | Mean              | 97.5 <sup>th</sup><br>percentile |
| 1.50   | 3.69                             | 1.58                       | 3.19                             | 1.70               | 3.06                             | 1.52              | 2.75                             |

#### Previous estimates of dietary acrylamide exposure

19. Exposures estimated from the 2014 TDS were also calculated in the age range 1.5 to 3.99 years (toddlers) for comparison with the exposure assessments that were reported previously based on the 2005 TDS data (FSA, 2005) for children in a similar age range (1.5 to 4.5 year old). The mean and 97.5th percentile exposure estimated for toddlers using the 2014 TDS were 1.55 and 3.06  $\mu\text{g}/\text{kg bw}/\text{day}$ , respectively, compared to 1.0 and 1.8  $\mu\text{g}/\text{kg bw}/\text{day}$ , respectively derived from 2005 TDS. The groups that made the highest contribution to exposure in 1.5 to 3.99 year old children using the 2014 TDS data were in the order potatoes > miscellaneous cereals > non-alcoholic beverages > snacks. Acrylamide levels in the non-alcoholic beverages group in the TDS would be influenced by the presence in this group of coffee which is a rich source of acrylamide. However, since coffee, is not consumed in significant quantities in 1.5 to 3.99 year old children, the exposure estimated for the non-alcoholic beverages group in this population would be an overestimation. The 2005 TDS data indicated that cereal-based products and potatoes were the main contributors to total dietary exposure in the UK, which is in line with the 2014 TDS assessments.

20. The 2005 TDS comprised 20 groups compared with the 28 investigated in the 2014 TDS. For the 2014 TDS alcoholic and non-alcoholic beverages were in separate groups and there were the following additional groups: Meat Substitutes, Snacks, Desserts, Sandwiches, Condiments, Tap Water and Bottled Waters. A like for like comparison of food groups between survey years should be treated with caution. The food categories comprising the food groups are not identical in some cases and cooking and preparation also differ. For example the 2014 Potato group included fried products whilst the 2005 Potato group did not. Thus these data do not necessarily indicate that dietary exposure to acrylamide has increased over the past decade.

21. Dietary exposure to acrylamide was reported by EFSA (2015), based on occurrence data collected throughout Europe and UK consumption data. Baseline exposure to acrylamide reported by EFSA for the UK infants, toddlers, older children and adults was within the range of values reported for

other countries. The mean and 97.5th percentile baseline exposure estimated for infants in all countries ranged from 0.5 -1.6 and 1.4 - 2.5 µg/kg bw/day, respectively. Baseline mean and 97.5th percentile exposure reported by EFSA for the UK infants, ranged from 0.8 -1.1 and 1.8 - 2.1 µg/kg bw/day, respectively. For toddlers; the mean and 97.5th percentile baseline exposure for all countries ranged from 0.9 -1.9 and 1.4 - 3.4 µg/kg bw/day, respectively; mean and 97.5th percentile exposures reported by EFSA for UK toddlers' ranged from 1.4 -1.5 and 2.6 - 2.8 µg/kg bw/day, respectively.

### **Comparison to the BMDLs**

22. The possible health risks arising from dietary exposure to acrylamide are assessed by comparison with the BMDL<sub>10</sub> of 0.17 mg/kg bw/day for neoplastic effects and 0.43 mg/kg bw/day for non-neoplastic effects such as neurotoxicity. The Committee on Carcinogenicity (COC) advises that an MOE of less than 10,000, based on a BMDL<sub>10</sub> from an animal study may be a concern (COC, 2012). Interpretation of MOEs for non-neoplastic effects based on a BMDL<sub>10</sub> from an animal study takes into account the default uncertainty factor of 100 for inter- and intra-species differences and possible additional factors for important gaps in the toxicological database (WHO, 2009). For acrylamide the database is extensive and important gaps have not been identified. Therefore an MOE greater than 100 indicates a lack of concern for neurotoxicity or other non-neoplastic effects.

23. Dividing the BMDL<sub>10</sub> for neoplastic effects by the highest UB exposure estimate from exclusive breastfeeding (0.41µg/kg bw/day) indicates an MOE of greater than 400. However the actual MOE might be very much larger since this is based on the UB estimate, and this comparison is not informative. For non-neoplastic effects the MOE is greater than 1000 which does not indicate a concern.

24. For exclusive feeding on infant formula, the highest estimated LB-UB exposure was 0.092-0.793. At the LB, the MOE for neoplastic effects is 1800 indicating a concern. For non-neoplastic effects the MOE is greater than 500 which does not indicate a concern.

25. For dietary exposure of infants and young children in all age groups the MOEs for neoplastic effects range from 50 to 280 which is low for a chemical that is genotoxic and carcinogenic. For non-neoplastic effects the MOEs are all greater than 100 and do not indicate a concern.

Questions on which the views of the Committee are sought

26. Members are invited to consider the following questions and to raise any other matters that arise.

i. Do Members agree that a draft COT statement should be prepared on this topic?



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- ii. If so, do Members agree with the approach taken in this discussion paper, including the focus on dietary exposure rather than other sources of exposure?
- iii. Do Members have other comments with respect to the approach to be taken and content of a draft statement?

**Secretariat**  
**March 2016**

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## TOX/2016/XX ANNEX A

### COMMITTEE ON TOXICITY OF CHEMICALS IN FOOD, CONSUMER PRODUCTS AND THE ENVIRONMENT

#### Review of potential risks from acrylamide in the diet of infants aged 0 to 12 months and children aged 1 to 5 years

Table A1. Estimated **acrylamide** exposures from the 2014 TDS in infants aged 4 to 12 months (main contributors to total mean are highlighted).

| Food Groups                | 4 to 5.99 month-olds<br>(n=116) |                 | 6 to 8.99 month-olds<br>(n=606) |                 | 9 to 11.99 month-olds<br>(n=686) |                 |
|----------------------------|---------------------------------|-----------------|---------------------------------|-----------------|----------------------------------|-----------------|
|                            | µg/kg bw/day                    |                 | µg/kg bw/day                    |                 | µg/kg bw/day                     |                 |
|                            | Mean                            | 97.5 percentile | Mean                            | 97.5 percentile | Mean                             | 97.5 percentile |
| Alcoholic drinks           | 0                               | 0               | 0                               | 0               | 0                                | 0               |
| Bottled water              | 0                               | 0               | 0                               | 0               | 0                                | 0               |
| Bread                      | 0.001                           | 0.012           | 0.010                           | 0.059           | 0.026                            | 0.096           |
| Canned veg                 | 0.001                           | 0.022           | 0.007                           | 0.063           | 0.014                            | 0.092           |
| Carcase meat <sup>+</sup>  | 0                               | <0.003          | <0.002                          | <0.012          | <0.003                           | <0.015          |
| Condiments                 | 0.001                           | 0.017           | 0.007                           | 0.060           | 0.010                            | 0.067           |
| Dairy products             | <b>0.301</b>                    | 1.334           | <b>0.188</b>                    | 1.144           | <b>0.126</b>                     | 0.650           |
| Desserts                   | 0                               | 0               | 0.002                           | 0.029           | 0.003                            | 0.042           |
| Eggs                       | 0                               | 0               | 0.001                           | 0.006           | 0.001                            | 0.009           |
| Fats and oils <sup>+</sup> | 0                               | <0.001          | 0                               | <0.002          | <0.001                           | <0.003          |
| Fish                       | 0.001                           | 0.009           | 0.003                           | 0.023           | 0.006                            | 0.033           |
| Fresh fruit                | 0.008                           | 0.051           | 0.017                           | 0.081           | 0.026                            | 0.105           |
| Fruit products             | 0.013                           | 0.067           | 0.014                           | 0.072           | 0.012                            | 0.071           |
| Green veg                  | 0.004                           | 0.027           | 0.007                           | 0.033           | 0.009                            | 0.052           |
| Meat products              | 0                               | 0               | 0.003                           | 0.028           | 0.008                            | 0.051           |
| Meat substitutes           | 0                               | 0               | 0                               | 0               | 0                                | 0               |
| Milk                       | 0                               | 0.005           | 0.002                           | 0.014           | 0.006                            | 0.052           |
| Misc cereals               | <b>0.038</b>                    | 0.216           | <b>0.167</b>                    | 0.711           | <b>0.267</b>                     | 0.912           |
| Non-alcoholic beverages    | 0.011                           | 0.084           | 0.024                           | 0.185           | 0.043                            | 0.290           |
| Nuts                       | 0                               | 0               | 0                               | 0.001           | 0                                | 0.005           |
| Offals                     | 0                               | 0               | 0                               | 0               | 0                                | 0               |
| Other veg                  | <b>0.053</b>                    | 0.346           | <b>0.087</b>                    | 0.353           | <b>0.088</b>                     | 0.351           |
| Potatoes                   | <b>0.145</b>                    | 0.992           | <b>0.345</b>                    | 1.702           | <b>0.505</b>                     | 2.007           |
| Poultry                    | 0.001                           | 0.017           | 0.003                           | 0.018           | 0.006                            | 0.029           |
| Snacks                     | 0.015                           | 0.051           | 0.021                           | 0.203           | 0.040                            | 0.311           |
| Sugars                     | 0                               | 0.006           | 0.002                           | 0.018           | 0.004                            | 0.026           |
| Tap water                  | 0                               | 0               | 0                               | 0               | 0                                | 0               |
| <b>Total</b>               | <b>0.594</b>                    | <b>2.081</b>    | <b>0.911</b>                    | <b>2.702</b>    | <b>1.206</b>                     | <b>3.138</b>    |

<sup>+</sup> Levels were below the LOQ of 3.0 µg/kg, estimated exposure for this group is upper-bound.

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Table A2. Estimated **acrylamide** exposures from the 2014 TDS in infants aged 12 to 18 months (main contributors to total mean are highlighted).

| Food Groups                | 12 to 14.99 month-olds<br>(n= 670 ) |                 | 15 to 18 month-olds<br>(n= 605) |                 |
|----------------------------|-------------------------------------|-----------------|---------------------------------|-----------------|
|                            | µg/kg bw/day                        |                 | µg/kg bw/day                    |                 |
|                            | Mean                                | 97.5 percentile | Mean                            | 97.5 percentile |
| Alcoholic drinks           | 0                                   | 0               | 0                               | 0               |
| Bottled water              | 0                                   | 0               | 0                               | 0               |
| Bread                      | 0.040                               | 0.108           | 0.044                           | 0.119           |
| Canned veg                 | 0.021                               | 0.107           | 0.020                           | 0.095           |
| Carcase meat <sup>+</sup>  | <0.003                              | <0.015          | <0.004                          | <0.018          |
| Condiments                 | 0.010                               | 0.059           | 0.011                           | 0.057           |
| Dairy products             | 0.092                               | 0.483           | 0.079                           | 0.342           |
| Desserts                   | 0.005                               | 0.057           | 0.005                           | 0.058           |
| Eggs                       | 0.002                               | 0.011           | 0.002                           | 0.011           |
| Fats and oils <sup>+</sup> | <0.001                              | <0.003          | <0.001                          | <0.003          |
| Fish                       | 0.008                               | 0.037           | 0.008                           | 0.038           |
| Fresh fruit                | 0.035                               | 0.120           | 0.043                           | 0.123           |
| Fruit products             | 0.012                               | 0.087           | 0.014                           | 0.092           |
| Green veg                  | 0.008                               | 0.035           | 0.009                           | 0.033           |
| Meat products              | 0.016                               | 0.085           | 0.020                           | 0.092           |
| Meat substitutes           | 0                                   | 0               | 0.001                           | 0.009           |
| Milk                       | 0.026                               | 0.075           | 0.026                           | 0.064           |
| Misc cereals               | 0.367                               | 1.152           | 0.444                           | 1.308           |
| Non-alcoholic beverages    | 0.075                               | 0.355           | 0.091                           | 0.428           |
| Nuts                       | 0.002                               | 0.008           | 0.001                           | 0.008           |
| Offals                     | 0                                   | 0               | 0                               | 0               |
| Other veg                  | 0.071                               | 0.257           | 0.072                           | 0.235           |
| Potatoes                   | 0.634                               | 2.328           | 0.587                           | 1.921           |
| Poultry                    | 0.007                               | 0.030           | 0.008                           | 0.033           |
| Snacks                     | 0.054                               | 0.369           | 0.084                           | 0.580           |
| Sugars                     | 0.008                               | 0.047           | 0.012                           | 0.058           |
| Tap water                  | 0                                   | 0               | 0                               | 0               |
| <b>Total</b>               | <b>1.496</b>                        | <b>3.687</b>    | <b>1.585</b>                    | <b>3.186</b>    |

<sup>+</sup> Levels were below the LOQ of 3.0 µg/kg, estimated exposure for this group is upper-bound.

This is a background paper for discussion.  
It does not reflect the views of the Committee and should not be cited.

Table A3. Estimated **acrylamide** exposures from the 2014 TDS in children aged 18 to 60 months (main contributors to total mean are highlighted)

| Food Groups                | 18 to 24 month-olds (n=70) |                 | 24 to 60 month-olds (n=429) |                 |
|----------------------------|----------------------------|-----------------|-----------------------------|-----------------|
|                            | µg/kg bw/day               |                 | µg/kg bw/day                |                 |
|                            | Mean                       | 97.5 percentile | Mean                        | 97.5 percentile |
| Alcoholic drinks           | 0                          | 0               | 0                           | 0               |
| Bottled water              | 0                          | 0               | 0                           | 0               |
| Bread                      | 0.047                      | 0.105           | 0.053                       | 0.124           |
| Canned veg                 | 0.035                      | 0.134           | 0.022                       | 0.083           |
| Carcase meat <sup>+</sup>  | <0.004                     | <0.020          | <0.002                      | <0.013          |
| Condiments                 | 0.008                      | 0.039           | 0.012                       | 0.064           |
| Dairy products             | 0.087                      | 0.402           | 0.051                       | 0.185           |
| Desserts                   | 0.007                      | 0.076           | 0.005                       | 0.041           |
| Eggs                       | 0.002                      | 0.009           | 0.002                       | 0.009           |
| Fats and oils <sup>+</sup> | <0.001                     | <0.004          | <0.001                      | <0.004          |
| Fish                       | 0.010                      | 0.040           | 0.008                       | 0.029           |
| Fresh fruit                | 0.052                      | 0.137           | 0.038                       | 0.100           |
| Fruit products             | 0.031                      | 0.120           | 0.028                       | 0.136           |
| Green veg                  | 0.007                      | 0.044           | 0.008                       | 0.031           |
| Meat products              | 0.024                      | 0.110           | 0.029                       | 0.096           |
| Meat substitutes           | 0                          | 0.003           | 0.001                       | 0.012           |
| Milk                       | 0.025                      | 0.077           | 0.017                       | 0.050           |
| Misc cereals               | 0.474                      | 0.993           | 0.387                       | 0.980           |
| Non-alcoholic beverages    | 0.123                      | 0.508           | 0.118                       | 0.343           |
| Nuts                       | 0                          | 0.001           | 0.001                       | 0.020           |
| Offals                     | 0                          | 0               | 0                           | 0               |
| Other veg                  | 0.043                      | 0.145           | 0.045                       | 0.161           |
| Potatoes                   | 0.602                      | 1.269           | 0.547                       | 1.601           |
| Poultry                    | 0.009                      | 0.025           | 0.008                       | 0.032           |
| Snacks                     | 0.098                      | 0.594           | 0.114                       | 0.601           |
| Sugars                     | 0.014                      | 0.065           | 0.020                       | 0.083           |
| Tap water                  | 0                          | 0.001           | 0                           | 0               |
| <b>Total</b>               | <b>1.704</b>               | <b>3.055</b>    | <b>1.518</b>                | <b>2.746</b>    |

<sup>+</sup> Levels were below the LOQ of 3.0 µg/kg, estimated exposures for this group is upper-bound.

This is a background paper for discussion.  
It does not reflect the views of the Committee and should not be cited.

Table A4. Estimated **acrylamide** exposures from the 2014 TDS in toddlers aged 1.5 to 3.99 years (18 to < 48 months) (main contributors to total mean are highlighted)

| Food Groups               | Toddlers aged 1.5 to 3.99 years ( $\mu\text{g}/\text{kg}$ bw/day) (n = 386) |                    |
|---------------------------|---|--------------------|
|                           | Mean  | 97.5 <sup>th</sup> |
| Alcoholic drinks          | 0.000   | 0.000              |
| Bottled water             | 0.000   | 0.000              |
| Bread                     | 0.051   | 0.132              |
| Canned veg                | 0.025   | 0.103              |
| Carcase meat <sup>+</sup> | <0.003  | <0.016             |
| Condiments                | 0.012   | 0.064              |
| Dairy products            | 0.060   | 0.206              |
| Desserts                  | 0.005   | 0.044              |
| Eggs                      | 0.002   | 0.009              |
| Fats and oils +           | <0.001  | <0.004             |
| Fish                      | 0.008   | 0.031              |
| Fresh fruit               | 0.040   | 0.107              |
| Fruit products            | 0.027   | 0.133              |
| Green veg                 | 0.008   | 0.035              |
| Meat products             | 0.028   | 0.096              |
| Meat substitutes          | 0.000   | 0.004              |
| Milk                      | 0.020   | 0.056              |
| Misc cereals              | 0.405   | 0.996              |
| Non-alcoholic beverages   | 0.127   | 0.394              |
| Nuts                      | 0.001   | 0.013              |
| Offals                    | 0.000   | 0.000              |
| Other veg                 | 0.045   | 0.161              |
| Potaotes                  | 0.559   | 1.570              |
| Poultry                   | 0.008   | 0.032              |
| Snacks                    | 0.102   | 0.593              |
| Sugars                    | 0.018   | 0.078              |
| Tap water                 | 0.000   | 0.000              |
| <b>Total</b>              | <b>1.554</b>  | <b>3.056</b>       |

<sup>+</sup> Levels were below the LOQ of 3.0  $\mu\text{g}/\text{kg}$ , estimated exposure for this group is upper-bound.