What are Heavy Metals? Heavy metals refers to any relatively high-density metallic element that is toxic or poisonous even at low concentrations. Heavy metals are natural components of the Earth’s crust and cannot be destroyed.

Metals such as lead, cadmium, mercury and others are found in certain foods. Eliminating them entirely from our food supply is not always possible because these metals are found in the air, water and soil, and then taken up by plants as they grow.

The toxicity of these metals is in part due to the fact that they accumulate in biological tissues, a process known as bioaccumulation. This process of bioaccumulation of metals occurs in all living organisms as a result of exposure to metals in food and the environment, including food animals such as fish and cattle as well as humans.

Effects on Health:

**Lead:** It can be very damaging to health, particularly infants, children and the developing fetus. Adverse effects include disruption of haemoglobin synthesis, kidney damage, increased blood pressure, miscarriage, nervous system disruption, and/or reduced fertility. Lead can cross the placenta and may damage the nervous system and brain of the developing fetus.

**Mercury:** Can cause toxin disruption of the nervous system, brain damage, damage to DNA and chromosomes, allergic reactions and adverse reproductive effects.

**Tin:** Long term exposure to tin can lead to nervous system disorders. Can cause gastrointestinal irritation and upset.

**Cadmium:** Long term exposure may lead to kidney damage as cadmium tends to accumulate in the kidneys. Other adverse health effects include diarrhoea, stomach pains, sickness, bone defects, immune system damage, possible infertility, possible damage to DNA and carcinogenic effects.

Control Measures:

Regulations for Maximum Levels (MLs) have been established for some heavy metals and it is important that food manufacturers comply with these levels as laid down in Commission Regulation (EC) No 1881/2006.

Control of heavy metal levels in food relies largely on avoiding those commodities that are likely to have been exposed to large concentrations of metal contaminants in the primary production environment.

Manufacturers must ensure that all equipment is constructed from food grade materials that meet the required standard.

It is important to source only raw materials from approved suppliers and that all processing water is sourced from potable suppliers that are not contaminated with heavy metals.
### Chemical Hazard :: Heavy Metals

#### SUMMARY TABLE

<table>
<thead>
<tr>
<th>Heavy Metal</th>
<th>Foodstuff</th>
<th>Maximum Acceptable Level (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Regulation (EC) No 1881/2006</td>
</tr>
<tr>
<td>Lead</td>
<td>Raw Milk and Heat-Treated Milk, Infant formula and follow on formula</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Meat (excluding offal) of bovine animals, sheep, pigs &amp; poultry</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Crustaceans</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Fruit and Vegetables (excluding berries)</td>
<td>0.10</td>
</tr>
<tr>
<td>Mercury</td>
<td>Fish Products and muscle meat of fish (excluding species such as brown meat of crab and head/thorax meat of lobsters and similar large crustaceans)</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Muscle meat of fish such as anglerfish, atlantic catfish, bonito, grenadier, halibut, marlin, megrim, mullet, pike, seabream, swordfish tuna</td>
<td>1.0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Cereals</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Fruit and Vegetables</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Crustaceans (excluding brown meat of crab and excluding head and thorax of lobster and similar large crustaceans)</td>
<td>0.50</td>
</tr>
<tr>
<td>Tin (Inorganic)</td>
<td>Canned food other than beverages</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>Canned beverages including fruit and vegetable juices</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Canned baby foods, infant formula and foods for special medical purposes</td>
<td>50</td>
</tr>
</tbody>
</table>

#### Occurrences in food
- Lead :: Water, Meat, Fish
- Mercury :: Fish, Shellfish, Fruit and Vegetables
- Cadmium :: Cereals, Fruit and Vegetables
- Tin (Inorganic) :: Canned Foods

#### Vulnerable Groups
- Infants and children
- Elderly
- People with chronic health conditions

#### Effects on health
- Gastrointestinal problems
- Nervous system disruption
- Kidney damage
- Effect development of fetus

#### Control
- Approved Suppliers
- Potable Water Source
- Only use food grade equipment

#### Published Risk Assessments
- EFSA provides risk assessment on mercury in fish: precautionary advice given to vulnerable group
- NCBI Heavy metals health risk assessment for population via consumption of food crops and fruits in Owerri, South Eastern, Nigeria
  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3567425/

#### References