Food safety – about perceived and real risks

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24.3% of the German population think that **food** is their highest personal health risk

18.3% mention **pollution, radiation and climate change**

Unhealthy lifestyle, smoking, alcohol, drugs and **pharmaceuticals** are mentioned much later by only 10 – 12%

n = 1.005, survey, BfR 2014
‘Objective risk’

The ‘objective risk’ is based on criteria of risks measurable by natural science.

**Classical Criteria:**
- **Probability** of an adverse effect
- **Extent** of damage

\[
\text{“Objective risk”} = \text{hazard} \times \text{exposure}
\]

**Further Criteria:**
- **Ubiquity:** local distribution of the potential adverse effect
- **Persistence:** temporal extension of the possible adverse effect
- **Reversibility:** possibility of reconstitution
- **Delay:** latency between occurrence and adverse effect
- **Uncertainty:** indicator for ambiguous components
Analytical accuracy - curse or blessing?

1 sugar cube containing 5 g sugar is detectable in Lake Constance

Total amount of water: about 50 trillion liters in annual average

10 Picogramm per Kilogramm

0,000 000 000 01 g/kg (10^{-12})
Perception of risks

„Should Dihydrogen Monoxid be banned or regulated in the EU?“

- yes
- no
- do not know – no answer

Subjective Risk Perception – the daily risk balance

Sozio-cultural factors

- **Voluntariness**: involuntary versus voluntary choice of risk
- **Controllability**: own possibility to avoid a risk
- Risk-Benefit-balance
- Personal **Involvement**
- **Dreadfulness** of the damage
- **Trust**: Credibility of the responsible institution
- **Responsibility**: natural versus anthropogenic risks
- **Latency** of Effects: acute versus temporally diffuse
Risk perception: over- and underestimation of risks

Differences in risk perception depend on **media reports, usualness or dreadfulness** of risks

• **risk compensation**: traveling by car instead of using flights

  ➔ 1,500 more people died from car accidents in the following 12 months in the USA

3,338 persons died by **road accidents** in Germany in 2013 (= 9 dead persons **per day**)

‘that happens to others, but not to me’

• **optimistic bias**: **under-estimation** of individual risks, often regarding unhealthy behaviour (**smoking, unhealthy diet, lack of physical activity**)

• **defensive optimism**: to **deny** hazards, believe in **mother nature** (safe and gracious)

• **functional optimism**: **over-estimation** of own (re)action possibilities (illusorific control)
Comparative Risk Estimation: EHEC vs. Dioxin 2011

How would you estimate your own personal risk of damaging your health when comparing the two incidents, dioxin in foodstuffs and EHEC in 2011?

- Risk of Dioxin is much higher: 14%
- Risk of Dioxin is slightly higher: 16%
- Both risks are equally high: 40%
- Risk of EHEC is slightly higher: 14%
- Risk of EHEC is much higher: 8%
- Do not know - no answer: 8%

n = 803
Information in percent
Mikrobial Risks – often underestimated

68% of the population are afraid of unhygienic conditions outside of their home

‘My home is my castle’

only 27% of the population are afraid of unhygienic conditions in their own kitchen

Source: Special Eurobarometer (EU) Risk Issues
Underestimated versus overestimated risks

Eurobarometer 2010 – risks associated with human nutrition

Pesticide residues in food (19%)
  Food pathogens (12%)
  Gene technology (8%)
  New technologies (1%)

‘Intuitive Toxicology’

Underestimation of natural risks like mildew toxins

Mildews produce aflatoxins,
which cause liver cancer

Legend of the gracious mother nature
For each characteristic, please tell whether it applies to food produced with or without pesticides

- **Healthy**: Applies more to food produced without pesticides (85), Applies to both product groups equally (6), Don't know/Not stated (6), Applies more to food produced with pesticides (3)
- **Expensive**: Applies more to food produced without pesticides (63), Applies to both product groups equally (15), Don't know/Not stated (9), Applies more to food produced with pesticides (13)
- **Tasty**: Applies more to food produced without pesticides (61), Applies to both product groups equally (22), Don't know/Not stated (7), Applies more to food produced with pesticides (10)
- **Progressive**: Applies more to food produced without pesticides (48), Applies to both product groups equally (11), Don't know/Not stated (13), Applies more to food produced with pesticides (28)
- **Innovative**: Applies more to food produced without pesticides (45), Applies to both product groups equally (12), Don't know/Not stated (22), Applies more to food produced with pesticides (21)
- **Toxic**: Applies more to food produced with pesticides (78), Applies to both product groups equally (8), Don't know/Not stated (13), Applies more to food produced without pesticides (5)

All respondents; n = 1,003; frequencies (%)

PD Dr. G.-F. Böl, 20. Japanese-German Symposium, Potsdam, 09.05.2015
To your knowledge, are pesticide residues generally allowed in food?

- Yes, pesticide residues are allowed in food (31%)
- No, pesticide residues are not allowed in food at all (67%)
- No idea (2%)

All respondents; n = 1.003; figures (%)

67% think that pesticide residues are illegal.
Toxic plant ingredients

Nature offers a lot of poisons, e. g. as stomac insecticide - these should only be eaten in small amounts

• coumarin – cinnamon, woodruff

• estragole, methyleugenol – tarragon, basil, fennel

• amygdalin – almonds, marzipan

• safrole – nutmeg, cinnamon, anise, black pepper
Early risk detection – new cooking methods

‘Beer can chicken’

Preparation

‘Wash the chicken, flush it thoroughly with water inside und dry it with paper towels. Open up a beer can and throw away 3 tablespoons of the beer.

Heat up the oven up to 150 degree.
Put the chicken onto the beer can.
Place it into the oven (on a backing sheet) and bake it for 1 hour. That fits very well with potatoes or a nice salad.’

Possible health risks from printing inks rsp. from aluminium

BfR-information 01.07.2014:
‘BfR advises against beer can chicken’
Adequate Risk Communication

- check **target group affiliation** beyond demography
- clarify **maturity regarding risks** and **willingness to decide**
- analyse **motivation** and **interest** of the involved parties
- evaluate your own **communication**: what do people understand?

- **assess** risks **mathematically**
- choose acceptable **visual parallels**
- give concrete **recommendations** for every day life
- neither **appease** nor **monger panic**
- create **transparency**, name **uncertainty**

- name the **population group** which is **affected by the risk**
- concretise the **severity and (ir-)reversibility** of the potential health impairment
- offer practical **possibilities** for **compensation** of risks
- **translate science comprehensibly** for everyday life
## Risks at a glance: the BfR Risk Profile

<table>
<thead>
<tr>
<th>A</th>
<th><strong>Affected group</strong></th>
<th>BfR risk profile on …</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td><strong>Affected group</strong></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td><strong>Probability of health impairment</strong></td>
<td>Practically impossible</td>
</tr>
<tr>
<td>C</td>
<td><strong>Severity of health impairment</strong></td>
<td>No impairment</td>
</tr>
<tr>
<td>D</td>
<td><strong>Validity of available data</strong></td>
<td>High: the most important data is available and there are no contradictions</td>
</tr>
<tr>
<td>E</td>
<td><strong>Controllability by the consumer</strong></td>
<td>Control not necessary</td>
</tr>
</tbody>
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# BfR Risk Profile: Cleaning products with nitric acid

## BfR Risk Profile:
Cleaning Products with a Concentration of 20-30% Nitric Acid
(Opinion No. 041/2010)

<table>
<thead>
<tr>
<th>A</th>
<th>Affected</th>
<th>General public</th>
<th>Children</th>
<th>B</th>
<th>Probability of health impairment through contact with cleaning products with a concentration of 20-30% nitric acid</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Practically excluded</td>
<td>Unlikely</td>
<td>Possible</td>
<td>Probable (through skin contact or inhalation of vapours)</td>
</tr>
<tr>
<td>C</td>
<td>Severity of health impairment through contact with cleaning products with a concentration of 20-30% nitric acid</td>
<td>No impairment</td>
<td>Slight impairment</td>
<td>Moderate impairment</td>
<td>Severe impairment, reversible or irreversible</td>
</tr>
<tr>
<td>D</td>
<td>Validity of available data</td>
<td>High: The most important data are available and consistent</td>
<td>Moderate: Some important data are missing or inconsistent</td>
<td>Low: Numerous data are missing or inconsistent</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Controllability by consumers [1]</td>
<td>Control not necessary</td>
<td>Controllable through precautionary measures</td>
<td>Controllable by avoidance</td>
<td>Not controllable</td>
</tr>
</tbody>
</table>
Food safety in the future

Crises in the field of food safety will rather increase

Problems

- transfer of pathogens from animals to humans (zoonoses)
- especially microorganisms as bacteria and virus in focus
- increasing development of resistant pathogens
- global trade with different standards of quality
- global forwards and backwards tracking of food so far insufficient

Possibilities for solution

- export of know-how to establish analogous risk assessment institutions worldwide
- further enlargement of rapid alert systems (RASFF, RAPEX)
- international harmonisation of quality standards
- prevention of further antibiotic resistance
- sensibilisation of consumers regarding kitchen hygiene
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Thank you for your attention!

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