German Federal Institute for Risk Assessment

FAQ

09 February 2024

Why a tiger is a hazard, but not necessarily a risk - The difference between risk and hazard

Terms such as danger, hazard or risk are often used interchangeably in everyday language. A precise distinction is rarely made. In consumer health protection, however, it is particularly important to use the terms **hazard** and **risk** in a targeted and differentiated way. For example, whether a substance poses a hazard or a risk, can have a considerable impact on how it is handled and, in the field of scientific risk assessment, on the recommendation to implement appropriate risk mitigation measures.

According to the European Transparency Regulation, which came into force in 2021, efforts should be made to better explain the difference between hazard and risk in risk communication.

In the following, the German Federal Institute for Risk Assessment (BfR) has presented the most important differences between the terms **hazard** and **risk** and illustrated them with examples.

What distinguishes a hazard from a risk?

To date, there is no standardised definition of the terms hazard and risk. Although a distinction is made between the terms in science, their use in different disciplines differs greatly. For example, the natural sciences and the humanities have their own definitions, based on the context of the discipline. In risk assessment, a hazard describes the potential of a situation or substance to harm health. A risk, on the other hand, describes the likelihood that health will be harmed by a situation or substance, and the severity of the harm.

How is a risk assessment carried out at the German Federal Institute for Risk Assessment (BfR)?

In Germany, the BfR is responsible for the assessment of risks in the area of consumer health protection and food and feed safety. This assessment is carried out using a four-stage system and includes hazard identification, hazard characterisation, exposure assessment and risk characterisation (see Guideline for Health Risk Assessment).

Which steps are part of the risk assessment process?

The first step is to identify and describe situations or substances that could have a negative impact on health (known as hazard identification). The harmful effects they could have on health are then assessed. In risk assessment, this is referred to as hazard characterisation. A risk is calculated from the hazardousness of a situation or a substance and the likelihood of contact with it. The latter is referred to as exposure. This level is determined in the third step, the exposure assessment. Finally, the risk itself is characterised. This involves analysing the type of the potential harm and the likelihood that it will actually occur (known as risk characterisation).

Why is it important to differentiate between hazard and risk?

In our daily lives, we constantly come into contact with potentially hazardous situations or substances. However, there is not necessarily a risk to our health. When hazards and risks are communicated, misunderstandings arise without the necessary differentiation. In most cases, the mere presence of substances in food is considered problematic, even if, from a scientific point of view, adverse health effects are not to be expected. In other words, even if a substance is hazardous, there is only a risk if consumers are exposed to it to a certain extent. The type of exposure (ingestion via food, skin or the respiratory tract) is just as important as the amount of the substance ingested. As Paracelsus said: The dose makes the poison.

What are concrete examples of the distinction between hazard and risk?

A tiger is a potential hazard to human health: If it attacks, it can cause serious injuries. However, if the tiger is in a zoo enclosure, the risk of the tiger causing harm is low. Whether or not the tiger is actually harmful to human health therefore depends not only on the respective behaviour of the human and the tiger, but also on the extent to which the human comes into contact with the tiger in the first place. If you encounter a tiger in the wild, the risk of harm to your health is greatly increased.

An example from the risk assessment of plant protection products: The active ingredients used in plant protection products are potentially hazardous substances. Whether they actually affect the health of consumers depends on how and whether a person comes into contact with the active substances, i.e. on exposure. Based on current knowledge, adverse health effects from pesticide residues are not to be expected when authorised pesticides are used as intended.

An example from food safety is hydrogen cyanide. This is a toxic substance that occurs naturally in bound form in foods such as linseed or bitter apricot kernels and is released when chewed. But only in small quantities. If the consumption instructions are followed, no adverse health effects are to be expected.

Where can I find clear examples of the distinction between hazard and risk?

In "BfR2GO", the BfR's science magazine, the difference between hazards and risks is clearly explained using several examples. In its *Hazard vs Risk campaign*, the European Food Safety Authority (EFSA) has also used short videos and several infographics to illustrate exemplary situations in which the difference becomes clear. These can be shared by the food safety

authorities of the European Member States and can be viewed at the following link. The BfR offers some of the short example videos in German on its YouTube channel.

Further information on hazard and risk on the BfR website

Questions and answers on risk assessment at the BfR
https://www.bfr.bund.de/en/risk_assessment_at_the_bfr__independent_and_transparent-187332.html

Evaluation of communication on the differences between "risk" and "hazard"
https://www.bfr.bund.de/cm/350/evaluation_of_communication_on_the_differences_between_risk_and_hazard.pdf

BfR guideline for the assessment of health risks
https://www.bfr.bund.de/cm/364/guideline-for-the-assessment-of-health-risks.pdf

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. The BfR advises the Federal Government and the States ('Laender') on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

On the German EFSA Focal Point

The Federal Institute for Risk Assessment (BfR) is the EFSA Focal Point Germany and thus the national contact point between the German institutions and authorities for food and feed safety and the European Food Safety Authority (EFSA). The aim of the German EFSA Focal Point is to promote cooperation and coordination of food risk assessment between the between the responsible stakeholders in the Member States and at European level in order to ensure food safety in Europe across the board.

efsa FOCAL POINT

This text version is a translation of the original German text which is the only legally binding version.

Legal notice

Publisher:
German Federal Institute for Risk Assessment
Max-Dohrn-Straße 8-10
10589 Berlin, Germany
T +49 30 18412-0
F +49 30 18412-99099
bfr@bfr.bund.de
bfr.bund.de/en

Institution under public law
Represented by the president Professor Dr Dr h.c. Andreas Hensel
Supervisory Authority: Federal Ministry of Food and Agriculture
VAT ID No. DE 165 893 448
Responsible according to the German Press Law: Dr Suzan Fiack

BfR | Identifying Risks – Protecting Health