

Health Risks of Carbon Monoxide



Bundesinstitut für Risikobewertung

BfR Risk Perception Research

Carbon monoxide (CO) is an odourless gas which forms when carbonic substances are not completely burned. In enclosed spaces, carbon monoxide can accumulate in the air – for example, when tiled stoves' air vents or gas-operated devices are defective or when barbecuing with charcoal. When inhaled, it can lead to severe health problems or even death.

A representative population survey carried out by the German Federal Institute for Risk Assessment (BfR) provides a better understanding of the German population's awareness, knowledge and perception of the risks of carbon monoxide poisoning, as well as their information behaviour relating to this issue.

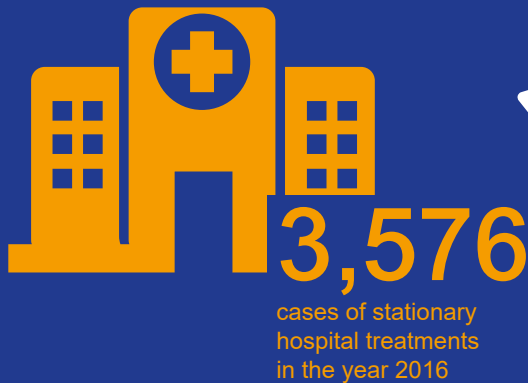
This brochure contains important background information, key results of the survey and the resulting conclusions for risk communication.

Carbon monoxide



Carbon monoxide is a colour- and odourless gas which, being a dangerous respiratory poison, can lead to death by suffocation. The first unspecific symptoms of poisoning are nausea, dizziness or headache. It is only later that heart palpitations, impaired consciousness and muscle weakness occur. These impairments prevent the affected person from leaving the room and getting to safety. Carbon monoxide poisoning does not always necessarily lead to death. However, it is agonising and can have long-term neuropsychological effects, such as anxiety and movement disorders.

You cannot see, smell, taste or hear carbon monoxide.

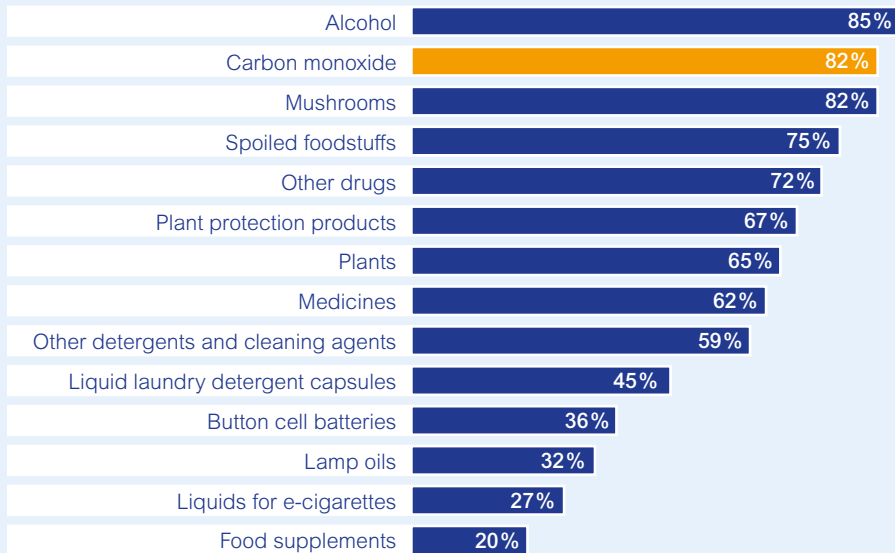


With a total of 640 registered cases, carbon monoxide poisoning caused the second most out of all poisoning-related deaths in 2016. The most cases were caused by poisoning through medicines and drugs. One hundred and twelve cases were a result of unintentional poisoning. In 2016, a total of 3,576 people were hospitalised due to carbon monoxide poisoning.*

* Source: GBE Bund (2016) (German Federal Health Monitoring System). Deaths by external causes and their effects and diagnostic data from hospitals, online: www.gbe-bund.de

How well known is carbon monoxide poisoning?

Have you heard of cases of poisoning with the following substances before ...?



Basis: all respondents (n=1,012)

82 percent of respondents have heard of cases of carbon monoxide poisoning before. In contrast to other poisoning risks, this makes carbon monoxide the most well known to the population.



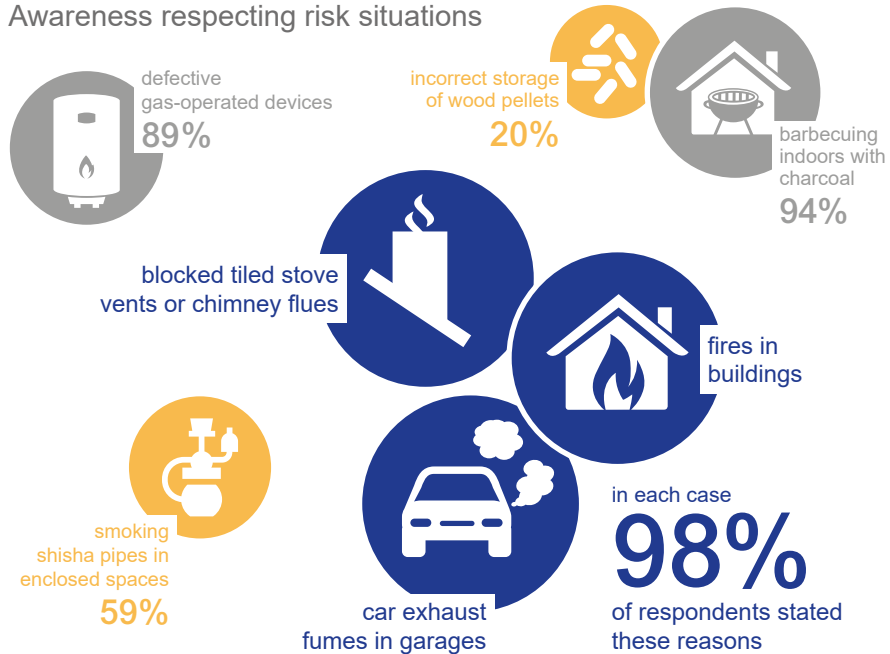
41%

rate the risk of experiencing
carbon monoxide poisoning
as high

41 percent rate the risk of unintentional carbon monoxide poisoning as rather high or very high. In comparison with foodstuffs, substances or products, only the risks of alcohol (42 percent) and drugs (45 percent) were rated as higher. So a large part of the population has already been sensitised to the possible health risks of carbon monoxide.

How does carbon monoxide poisoning occur?

Awareness respecting risk situations



Basis: 832 respondents who have heard of poisoning in connection with CO before

Most situations in which carbon monoxide poisoning could occur are known to the respondents. However, there are knowledge deficits. Only 59 percent know that smoking water pipes (shishas) in enclosed spaces can lead to poisoning. Only 20 percent know that wood pellets emit carbon monoxide during storage.

Some see health risks in situations which, from a scientific standpoint, do not lead to poisoning: a defective district heating system, for example (46 percent believe this), or barbecuing with an electric grill (24 percent) or a charcoal grill outside (12 percent).



How can you detect carbon monoxide?

Awareness respecting distinguishing features

Ninety-five percent of respondents know that carbon monoxide is a gas. Almost all respondents (96 percent respectively) know that you detect an increase in carbon monoxide concentration in the surrounding air by the alarm signal of a carbon monoxide detector as well as through headaches, dizziness or nausea.



Basis: 832 respondents who have heard of poisoning in connection with CO before



However, in each case more than a third of respondents wrongly believe you can detect carbon monoxide by its smell, dark smoke or the alarm of a smoke detector.



34%
believe you can detect CO
by a grey-black smoke

How can you protect yourself against carbon monoxide poisoning?

Awareness respecting preventative measures



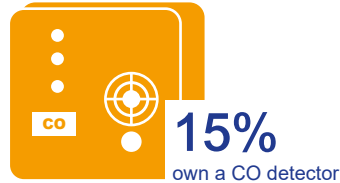
29%

name fresh air as a protective measure

Respondents are barely aware of preventative and protective measures: Only 9 percent name the installing of a carbon monoxide detector and only 8 percent the regular inspection of heating systems, tiled stoves or fireplaces by chimney sweeps.

The most frequently named protective measure is fresh air. However, 13 percent of respondents cannot name any protective measures.

While 90 percent of respondents own a smoke detector, only 15 percent have installed a carbon monoxide detector.



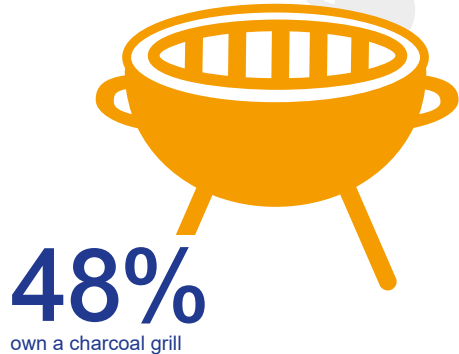
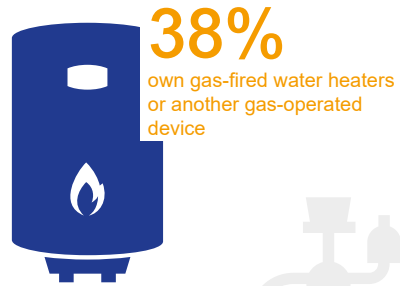
This is because in all German federal states (“Laender”) there is a legal obligation to install a smoke detector in private premises. There is no such obligation for carbon monoxide detectors so far.

A smoke detector does NOT sound the alarm for carbon monoxide. Only a specific carbon monoxide detector does this. It recognises carbon monoxide via an integrated sensor. When its concentration increases, the alarm goes off.

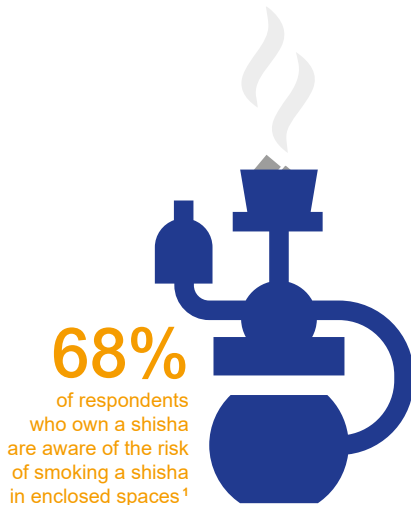
Who owns “risky devices”?

Those who own devices which, when defective or used improperly, increase the concentration of carbon monoxide in the air – and with that the risk of poisoning – should be particularly alert.

In total, 74 percent of respondents own at least one “risky device”. The most frequently owned device among respondents is a charcoal grill. Only a few own shishas (9 percent) or wood pellet heaters (5 percent).



Owners of “risky devices” often don't have a carbon monoxide detector installed. Among those who own a fireplace, heater or tiled stove, the proportion of 24 percent is the highest.*



Generally, the concrete health risks in connection with their own devices are known – with two exceptions: A third of those who own a shisha is not aware of the risks of smoking shisha in enclosed spaces.¹ Also, only 38 percent of respondents with wood pellet heaters are aware that poisoning can occur in connection with storing wood pellets.²

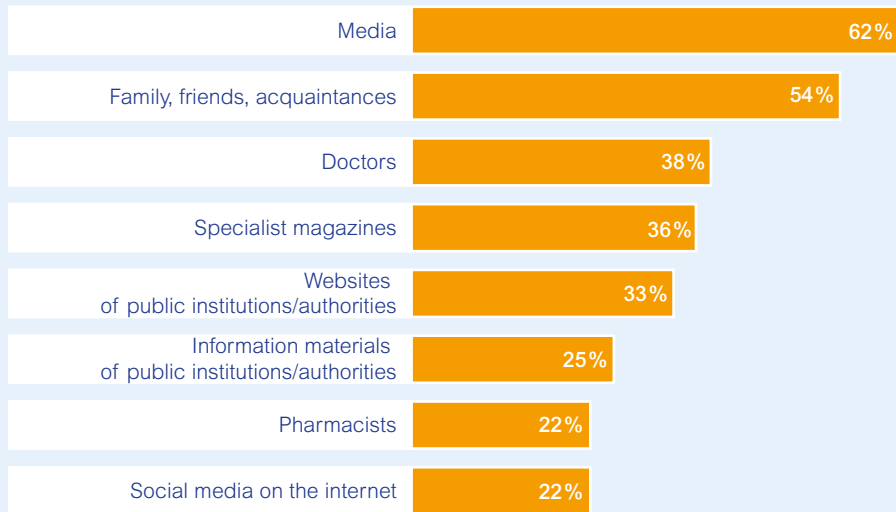
* Basis: n=322 people who own a fireplace, heater or tiled stove

¹ Basis: n=74 people who own a shisha and have heard of carbon monoxide poisoning before

² Basis: n=24 people who own a wood pellet heater and have heard of carbon monoxide poisoning before

What is the source of information used?

Twenty-eight percent of respondents have informed themselves about carbon monoxide before – above all through the media, as well as through family, friends or acquaintances.



Basis: all respondents (n=1,012)

BfR study “Risk perception of carbon monoxide”

Methodology	<i>Representative population survey by telephone on risk perception of poisoning, in particular through carbon monoxide</i>
Study period	<i>February to March 2019</i>
Sample	<i>1,012 respondents among the German-speaking population aged 14 years and over living in Germany</i>
Data weighting	<i>Data were weighted by age, gender, German federal state (“Land”), size of town and household in order to ensure representativeness</i>

Recommendations for communication

The results provide the following conclusions for communicating about the risk of carbon monoxide poisoning.



Even if many people are aware of the health risks of carbon monoxide poisoning, knowledge of concrete protective measures can be improved. Information should be available on how to protect oneself from poisoning.



Owners of wood pellet heaters are a further risk group. They mostly live in places with up to 20,000 inhabitants and could be reached via local media and information sources in rural areas.



A particular risk group is owners of a shisha. Their proportion is highest among those aged 14 to 29 years (26 percent). In this age group, social media is the third most important source of information after family, friends and acquaintances (46 percent get information about the risks of poisoning from there), so information could reach them well in this way.

Checklist for protecting against carbon monoxide poisoning



Do not use charcoal grills, outdoor gas heaters or emergency generators indoors – not even in the garage.



Have fireplaces, heaters, tiled stoves as well as gas heating, water heaters or other gas-operated devices inspected annually.



Do not leave car engines running in the garage.



Only smoke shishas indoors if there is sufficient ventilation.



Store wood pellets in such a way that gases cannot be emitted in rooms where there are people. Regularly ventilate wood pellet storage rooms.



Those owning risky devices should install a battery-operated carbon monoxide detector in the vicinity of the device and in bedrooms, preferably on the wall. Regularly check that it is functional.



In the case of an alarm signal, evacuate everyone in the house and call the fire brigade.
Seek medical help if you feel sick or dizzy.

About the BfR

Do nanoparticles promote the occurrence of allergies? Does apple juice contain harmful aluminium? The German Federal Institute for Risk Assessment (BfR) evaluates the possible health risks of food and feed, consumer products and chemicals. Its work makes an important contribution towards ensuring that food, products and chemicals are becoming safer in Germany. The institute is independent in its scientific evaluations, research and communication. It is the scientific establishment of the Federal Republic of Germany which prepares reports and opinions on issues of food and feed safety and on the safety of substances and products. The BfR belongs to the portfolio of the Federal Ministry of Food and Agriculture (BMEL).



More information

Jungnickel, K., M. Lohmann, G.-F. Böl. 2019. Carbon monoxide – an underestimated risk? Awareness, perception, knowledge, and prevention activities. Bundesgesundheitsblatt Gesundheitsforschung, 62: 11, 1324–1331. (Federal Health Bulletin, health research)

Begemann, K., N. Glaser, H. Desel. 2019. Poisoning by chemical substances and products. Bundesgesundheitsblatt Gesundheitsforschung, 62: 11, 1346–1353. (Federal Health Bulletin, health research)



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