



Key messages

- ▶ ETS exposure is associated with an increased risk of illness and premature mortality.
- ▶ One third of non-smoking adults and the majority of non-smoking children and adolescents in Germany are regularly exposed to ETS.
- ▶ People with a low social status are confronted with tobacco smoke particularly frequently.
- ▶ The population's exposure to ETS has declined over the last ten years.
- ▶ Measures to protect non-smokers are an important component of tobacco-control policy.

Health Risks of Environmental Tobacco Smoke Exposure

Environmental tobacco smoke (ETS) also known as exposure to second-hand smoke represents a major health risk. People who regularly spend time in rooms where others smoke are at increased risk for many diseases and disorders. These also include serious diseases such as cancers, cardiovascular and respiratory diseases which require a lot of treatment and can permanently affect a person's quality of life; they can sometimes be fatal.

The following study uses current data from the Robert Koch Institute to describe the spread of passive smoking among adults, children and adolescents in Germany. It also explains the health risks associated with ETS exposure and the measures to protect non-smokers that have been implemented in Germany up to now.

Environmental tobacco smoke exposure – even a little is too much

More than 4,800 different substances are released when tobacco products burn. 90 of these substances are suspected – or have been proven – to have a carcinogenic effect. Some substances have a directly toxic effect and can cause irritation, e.g. to the eyes or the upper respiratory tract. The potential health hazard of tobacco smoke remains high even when it is not inhaled directly but absorbed indirectly through the air in a room. The concentration of many harmful substances is actually higher in the smoke that is released into the environment than in tobacco smoke that is actively inhaled. Furthermore, toxins are deposited on walls, floors and objects, i.e. they are not removed by simple airing.

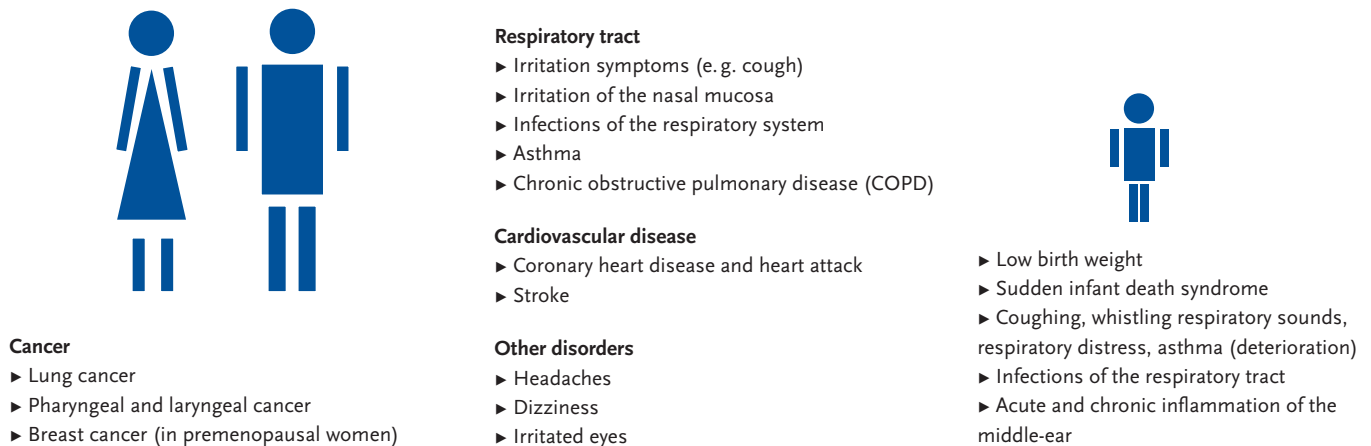
The carcinogenic components of second-hand smoke include polycyclic aromatic hydrocarbons, N-nitrosamines, arsenic and cadmium. The smoke also contains harmful substances such as carbon monoxide, ammonia and hydrogen cyanide. Substances that are added to tobacco products for production reasons or to improve the flavour (additives) also contribute to the formation of toxic combustion products. It is currently not possible to quantify a health-risk threshold value for exposure to ETS (DKFZ 2005, 2009).

Serious diseases caused by passive smoking

In principle, the kinds of health damage caused by passive smoking are similar to those associated with active smoking. In individual cases, even minor exposure can already contribute to the development of tumours. The risk of lung cancer is 20% to 30% higher among non-smokers who are regularly exposed to ETS (USDHHS 2006). Moreover, studies suggest that passive smoking can lead to biochemical changes just a short time after exposure to relatively low doses of smoke; these changes

Figure 1
Risks of environmental tobacco smoke exposure

Quelle: modified from DKFZ 2009



can encourage, for example, the formation of blood clots in coronary arteries and thus acutely trigger a heart attack (Raupach 2006). In addition to cancer and cardiovascular disease, regular exposure to second-hand smoke can also cause – or aggravate – other serious illnesses, e. g. stroke, asthma or chronic obstructive pulmonary disease. Other acute symptoms that frequently occur include headaches, dizziness, nausea, and irritation of the respiratory tract, nasal mucosa or the eyes (Figure 1). It is estimated that in Germany alone more than 3,300 deaths a year are caused by regular exposure to ETS (Keil et al. 2005).

Children are particularly at risk

Environmental tobacco smoke has particularly severe effects on the health of children and adolescents, because their organs and organ systems are yet not fully developed and therefore very sensitive. For example, a mother who smokes during pregnancy can cause irreversible organic damage to her baby and increase its risk of contracting certain diseases later in life.

Correlations have also been proven between maternal smoking and pregnancy complications, preterm delivery and low birth weight. A large proportion of mothers who are abstinent during pregnancy start smoking again after childbirth. In addition, children are affected by ETS exposure from other family members and contact persons who smoke. These children have a heightened risk of, among other things, sudden infant death syndrome, acute and chronic inflammations of the middle-ear, bronchial asthma and infections of the lower respiratory tract (DKFZ 2005, 2009; USDHHS 2006).

One in three non-smoking adults is affected

The latest data on the distribution of passive smoking among adults is provided by the study »German Health Update« (GEDA) (www.rki.de/geda). According to this study, in 2009

about 33 % of the non-smoking population aged 18 years and older were exposed to ETS at least one day a week.

This applied more to men than to women (42 % versus 26 %). The highest exposure was found to be among young adults aged between 18 and 29, but large sections of the middle-aged adult population are also regularly confronted with tobacco smoke. Not until the age of 60 does exposure to second-hand smoke gradually fall off (Figure 2).

German Health Update (GEDA)

<i>Data holder:</i>	Robert Koch Institute
<i>Objectives:</i>	To provide up-to-date data on health-related issues, to analyse temporal developments and trends
<i>Survey method:</i>	Computer-assisted telephone interviews (CATI)
<i>Population:</i>	Residential population of Germany aged 18 and over
<i>Sample:</i>	21.262 women und men
<i>Cooperation rate:</i>	51,2 %
<i>Survey period:</i>	July 2008 to June 2009

9 % of non-smoking women and 13 % of non-smoking men state that they are exposed to ETS every day. A further 3 % of non-smoking women and 6 % of non-smoking men are affected on four to six days a week. 14 % of women and 22 % of men who do not smoke themselves are confronted with tobacco smoke on one to three days a week.

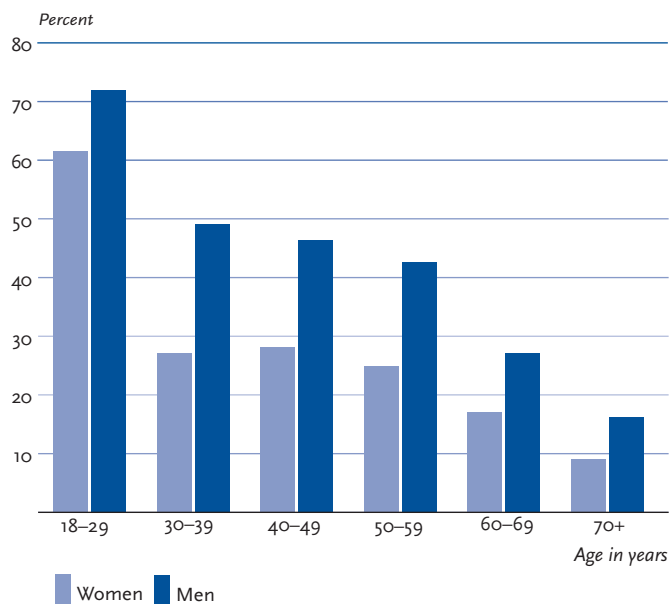
High levels of ETS exposure at the workplace

The GEDA study also provides information on the places where people are exposed to ETS. One striking finding is that men are confronted with tobacco smoke at work much more frequently than women. Men are also more often

exposed to ETS than women in pubs, bars, discotheques and restaurants, and when visiting friends and acquaintances.

The only area where there are no significant differences between the sexes is in the case of ETS exposure in people's own homes. ETS exposure at work is understated when the population aged 18 and older is observed (Figure 3). If the sample is limited to the working population between 18 and 64, the prevalences are 14 % among non-smoking women and 31 % among non-smoking men.

Figure 2
Percentage of non-smokers who are exposed to ETS, by age
Data basis: GEDA 2009



Majority of children and adolescents are exposed to ETS

Information on the exposure of children and adolescents to ETS can be provided on the basis of data from the German Health Interview and Examination Survey for Children and Adolescents (KiGGS) (www.kiggs.de). For the period between 2003 and 2006 it shows that almost

half of adolescents up to the age of 17 lived with at least one smoking parent (Figure 4). Both parents smoked in the case of 19 % of these adolescents. Nearly a third of the parents reported that they smoked in the presence of their children at home.

Approximately one in six women smoked during pregnancy, thus exposing their unborn children to a considerable health risk. 5 % of mothers said they smoked regularly during pregnancy. About 11 % of women smoked – 2 % regularly – during lactation.

Self-reports by adolescents aged 11 to 17 are another source of information in the KiGGS study for assessing exposure to ETS – in addition to the statements made by the parents. According to these reports, approximately 85 % of non-smoking adolescents spend at least some time in rooms where people smoke. About 25 % of adolescents are exposed to second-hand smoke on a daily basis; a further 15 % are confronted with tobacco smoke several times a week (Lampert 2008).

German Health Interview and Examination Survey for Children and Adolescents (KiGGS)

<i>Data holder:</i>	Robert Koch Institute
<i>Objectives:</i>	Description and analysis of the health situation of children and adolescents
<i>Survey methods:</i>	Written surveys and physical examination
<i>Population:</i>	0- to 17-year-old resident population in Germany
<i>Sample:</i>	17,641 girls and boys
<i>Response rate:</i>	66.6 %
<i>Survey period:</i>	May 2003 – May 2006

ETS exposure varies according to social status

In order to target measures to protect non-smokers effectively, it is important to know the population groups in which ETS exposure is particularly high. Analyses on correlations with

Figure 3
Percentage of non-smokers aged 18 and over who are exposed to ETS, by exposure location
Data basis: GEDA 2009

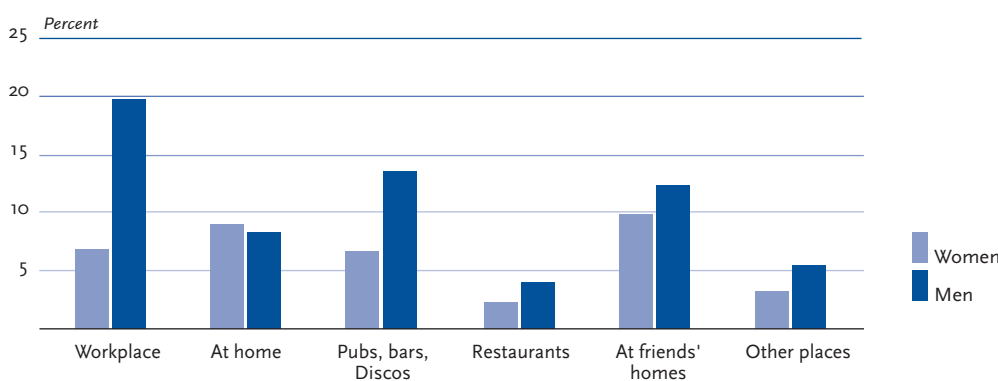
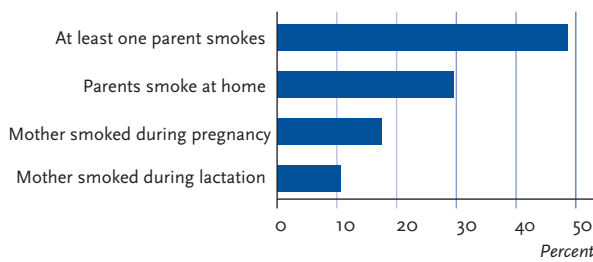


Figure 4
Exposure to ETS of children and adolescents aged 0–17
 Data basis: KiGGS 2003–2006



social status can provide clues in this context. Social status is determined in the RKI's health surveys on the basis of information given by respondents on their level of education, occupational status and income situation.

The data for 2009 from the GEDA study indicates that ETS exposure is highest among people with a low social status. These differences are very striking in young and middle age, but are weaker in later life (Figure 5). Statistical monitoring of the age effect indicates that female non-smokers with a low social status have a greater risk of being regularly confronted by tobacco smoke than non-smoking women from the higher status group: the risk is increased by a factor of two (OR=2.00, 95% CI=1.67 to 2.39). In the case of male non-smokers the corresponding factor is 1.9:1 (OR=1.86, 95% CI=1.58 to 2.20).

These differences are primarily caused by higher levels of ETS exposure among men in their own homes and when visiting friends and acquaintances. The workplace also plays a role when it comes to the differences among men. By contrast, there are no significant differences between status groups when it comes to ETS exposure in cafes, bars, discotheques and restaurants.

Among children and adolescents, too, there is a connection between social status and exposure to second-hand smoke. Children and adolescents from the low-status group are 3.7 times more likely to have smoking parents than their peers from the high-status group (OR = 3.73, 95% CI = 3.33 to 4.19). Parents with a low social status state 5.1 times more frequently (OR = 5.07, 95% CI = 4.40 to 5.84) that they smoke in the presence of their children at home.

Status-specific differences are equally striking when it comes to maternal smoking during pregnancy (OR = 5.12, 95% CI = 4.26 to 6.15).

Effective protection by means of smoking bans

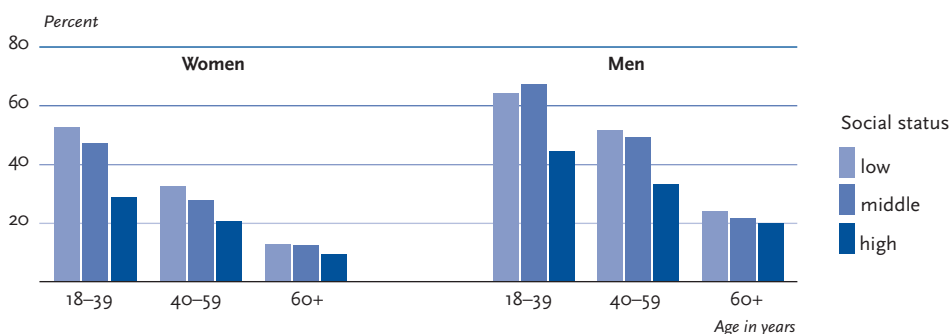
Rigorously implemented smoking bans at the workplace, in public buildings, public transport, restaurants and the leisure sector directly reduce exposure to tobacco smoke and the associated health hazards. For example, it has been shown that the rate of respiratory diseases and disorders among employees in the catering trade already begins to fall shortly after the introduction of smoking bans (DKFZ 2009). Furthermore, the rate of heart attacks in the general population also drops (Goodman 2009). The best protection against ETS exposure is a reduction in tobacco use in the population. This can only be achieved by a whole set of coordinated structural and behaviour-related measures. Implementing smoking bans is very important in this context, in addition to higher taxes on tobacco, tobacco advertising bans, and measures to discourage people from starting to smoke and to help smokers overcome tobacco dependence (Kröger et al. 2010).

Although the legal legitimacy of smoking bans is primarily based on the aim of protecting non-smokers, bans also contribute significantly to reducing tobacco use and social acceptance of smoking. It has been proven that smoking bans at the workplace cut smoking prevalence by between four and ten percentage points. Moreover, the remaining smokers smoke less than before on average. Comprehensive smoking bans are more effective in this context than regulations that allow separate smoking rooms, for example. And when workplaces and public places are smoke-free, people are more willing not to smoke in their own homes. Furthermore, adolescents who live in a largely smoke-free environment are less likely to start smoking (DKFZ 2005, 2010).

Smoking bans that have been implemented to date

Tobacco-control measures have been intensified and the protection of non-smokers improved in Germany in recent

Figure 5
Percentage of non-smokers who are exposed to ETS, by social status and age
 Data basis: GEDA 2009



years. For instance, amendments to the Ordinance on Workplaces in 2004 and 2007 obliged employers to protect non-smoking employees effectively from the health hazards of tobacco smoke. Since September 2007, smoking bans have been in force in federal government buildings, public transport and passenger railway stations.

Laws protecting non-smokers have been enacted and enforced in all of Germany's federal states (Länder) in the meantime. However, these laws contain different detailed regulations and exceptions, e. g. on smoking in pubs, discotheques or beer tents. The regulations on monitoring and penalties also vary among the Länder (for an overview of the various anti-smoking laws in the Länder see www.rauchfrei.de or www.tabakkontrolle.de). The Federal Constitutional Court confirmed the legality of a general smoking ban in restaurants and similar establishments in its 2008 judgement, noting that protection against the dangers of ETS exposure must be regarded as a public good that is of paramount importance and must take precedence over restaurant owners' freedom to exercise their occupation and smokers' behavioural freedom. However, in some Länder the laws aimed at protecting non-smokers discriminated against publicans running small bars that had no separate room for smokers. According to the Constitutional Court's judgement, this unequal treatment had to be avoided – either by modifying the rules on exemptions or by introducing across-the-board smoking bans. In many cases the judgement did not lead to a general ban being established, but to enacted smoking bans being watered down.

Discussion

Data on the development of ETS exposure over time is required in order to evaluate the effectiveness of the regulations that have been introduced in recent years. Comparing the results of the 2009 GEDA study with those of the 1998 Federal Health Survey can provide some indications, although this is only possible for people aged between 18 and 79, since the 1998 Federal Health Survey was limited to this age range. The comparison shows that the proportion of non-smokers who are regularly exposed to second-hand smoke fell from 57% to 34% between 1998 and 2009. At the workplace the proportion of ETS-exposed non-smokers dropped from 22% to 13%.

A decline can also be observed in ETS exposure in people's own homes – from 14% to 9%. That exposure to second-hand smoke has declined in recent years is also confirmed by other studies, e. g. the Epidemiological Survey of Substance Abuse among Adults conducted by Institute for Therapeutic Research (Baumeister et al. 2008).

At the same time there is growing popular support in the population for smoking bans and laws to protect non-smokers. This is shown by the results of a representative survey conducted annually since 2005 by the Gesellschaft für Konsumforschung (Company for Consumer Research).

In 2009 73% of the population aged 16 and older expressed their approval for smoking bans in the catering sector, up from 53% in 2005. This positive development is mainly attributable to the fact that many smokers have changed their attitudes. A large majority of people who had never smoked or had quit smoking already advocated smoke-free restaurants in 2005 (DKFZ 2009).

Against this background it can be concluded, on the one hand, that the measures taken in recent years have improved protection from second-hand smoke and are strongly supported by the population. On the other hand, there is still considerable room for improvement, as is clearly shown by the lack of uniformity in the anti-smoking legislation in the different Länder and the fact that there are more stringent laws protecting non-smokers in many other countries both within Europe and beyond (see Tobacco Control Database, WHO Regional Office for Europe: <http://data.euro.who.int/tobacco>).

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