

Absolute diabetes risk



Field of action 1: Reducing the risk of diabetes

Adults

Background

In addition to age and a family history of the disease, risk factors for type 2 diabetes include modifiable factors such as overweight and physical inactivity [1]. The individual risk of developing type 2 diabetes in the next 5 years (absolute diabetes risk in percent) can be determined with the German Diabetes Risk Score (GDRS) in persons without a previous diabetes diagnosis [2]. For this purpose, the GDRS summarises the information on various risk factors of type 2 diabetes on a weighted basis.

Key messages

- ▶ In the 18- to 79-year-old population in 2010, the individual risk of developing type 2 diabetes over the next 5 years is 1.1%.
- ▶ The absolute diabetes risk among men is almost twice that among women.
- ▶ The absolute diabetes risk among women and men in the lower education group is more than twice as high as the risk among those in the middle and higher education group.

Figure 1: Temporal comparison of the absolute 5-year risk for type 2 diabetes in % among adults (18 – 79 years) without known diabetes by sex between 1998 and 2010 (age-standardised).

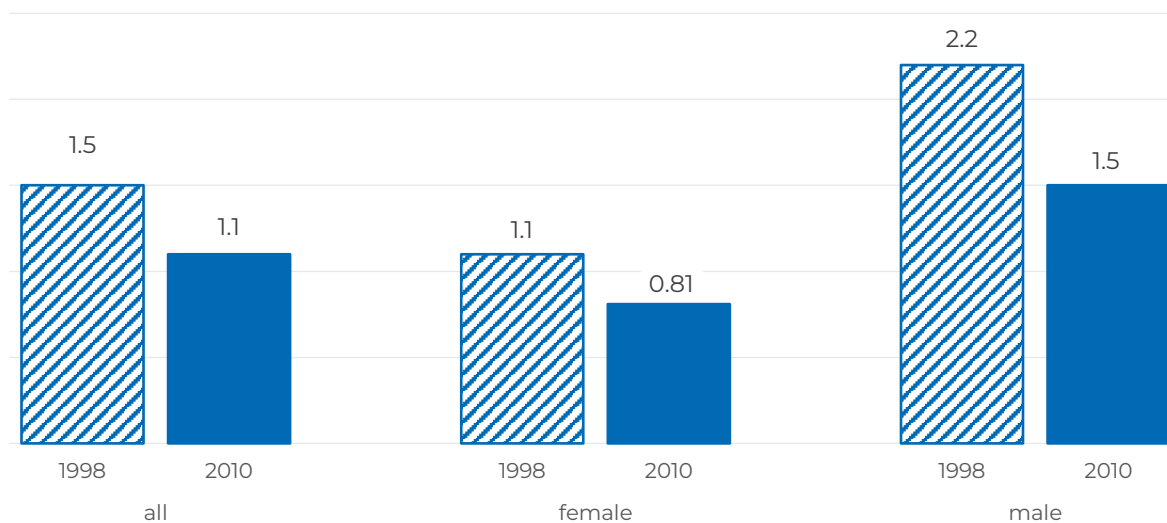


Figure 2: Absolute 5-year risk for type 2 diabetes in % among adults (18 – 79 years) without known diabetes by age and sex in 2010.

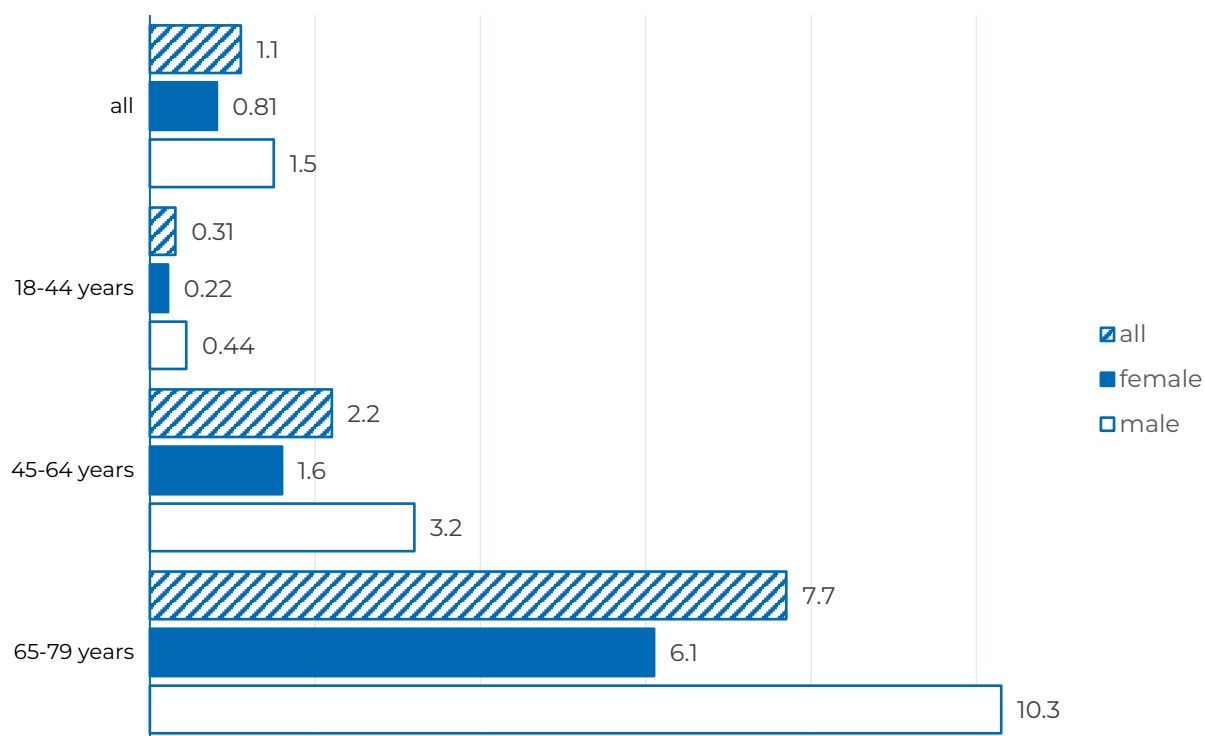


Figure 3: Absolute 5-year risk for type 2 diabetes in % among adults (18 – 79 years) without known diabetes by education group and sex in 2010.

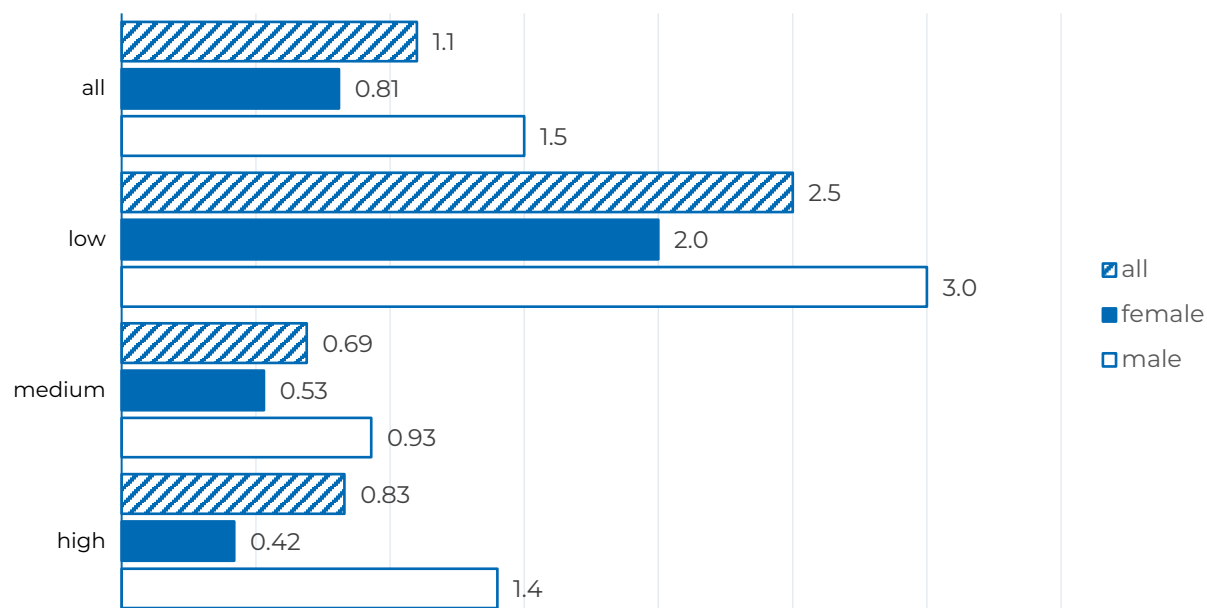
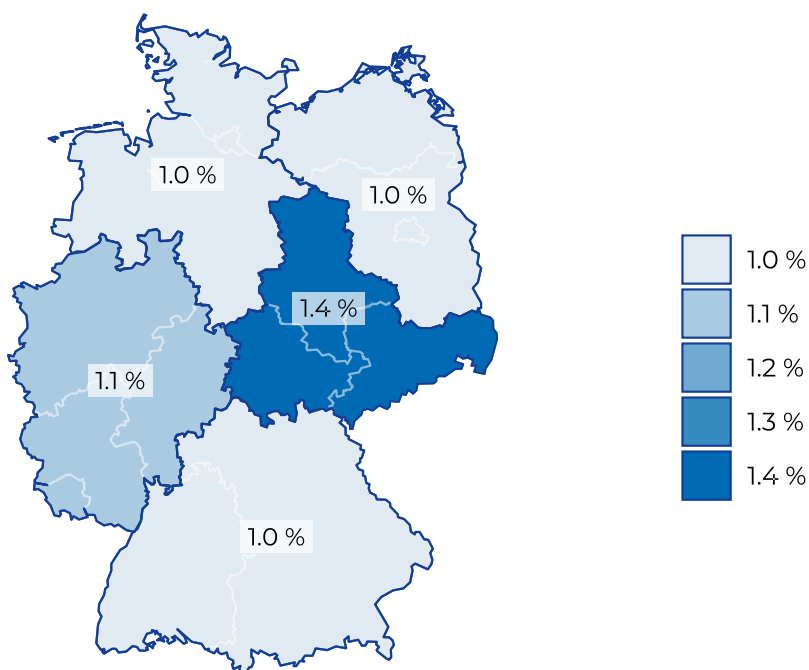


Figure 4: Absolute 5-year risk for type 2 diabetes in % among adults (18 – 79 years) without known diabetes by region (north east, north west, middle east, middle west, south) in 2010.



Results

In 2010, the 18- to 79-year-old population had an absolute diabetes risk of 1.1% (women: 0.81%; men: 1.5%). As expected, the absolute diabetes risk in both sexes increases with age and is several times higher among 65- to 79-year-olds (7.7%) than among 18- to 44-year-olds (0.31%). The absolute diabetes risk among women and men in the lower education group is more than twice as high as the risk among women and men in the middle and higher education group. Compared to 1998, the absolute diabetes risk decreased in 2010 among both sexes.

Conclusion

The decrease in the absolute diabetes risk between 1998 and 2010 is consistent with the decrease in the prevalence of prediabetes over the same period. The decrease in the absolute diabetes risk can mainly be attributed to a decrease in red meat consumption and waist circumference, which are risk factors considered by the GDRS [3]. Both red meat consumption and waist circumference can potentially be influenced by behaviour- and context-based preventive measures [4]. The differences between women and men as well as education groups indicate which population groups should be particularly in the focus of suitable prevention measures.

Methodology and data sources

Definition

The absolute diabetes risk indicator is defined as the geometric mean of the absolute 5-year risk for type 2 diabetes identified using the GDRS in the population without known diabetes and is given as a percentage (%).

Operationalisation

The figures are calculated using the following formula and take the characteristics of the risk factors associated with type 2 diabetes into account:

$$\begin{aligned}
 \text{GDRS points} = & 5.1 \times \text{age (years)} \\
 & + 7.6 \times \text{waist circumference (cm)} \\
 & - 2.7 \times \text{height (cm)} \\
 & + 47 \times \text{hypertension} \\
 & - 2 \times \text{physical activity (h/week)} \\
 & + 15 \times \text{former smoking (< 20 cigarettes/day)} \\
 & + 45 \times \text{former smoking (\geq 20 cigarettes/day)} \\
 & + 23 \times \text{current smoking (< 20 cigarettes/day)} \\
 & + 77 \times \text{current smoking (\geq 20 cigarettes/day)} \\
 & + 55 \times \text{consumption of red meat (150 g/day)} \\
 & - 7 \times \text{consumption of whole grain bread/muesli (50 g/day)} \\
 & - 5 \times \text{coffee consumption (150 ml/day)} \\
 & + 56 \times \text{one parent with diabetes} \\
 & + 106 \times \text{both parents with diabetes} \\
 & + 48 \times \text{at least one sibling with diabetes}
 \end{aligned}$$

$$\text{Absolute diabetes risk (\%)} = 1 - 0.99061^{\exp(\text{GDRS points} - 474.17096591/100)}$$

Reference population

Resident population in Germany without known diabetes, aged 18 to 79 years

Data source

Nationwide interview and examination surveys 1997-1999 (German National Health Interview and Examination Survey 1998, GNHIES98) and 2008-2011 (German Health Interview and Examination Survey for Adults, DEGS1) of the Robert Koch Institute (RKI) based on a population registry sample and self-completed questionnaire, medical interview, automated medicine registration and examination.

Number of cases

- ▶ GNHIES98: n = 7,124
- ▶ DEGS1: n = 7,115 (of which n = 2,923 had also participated in GNHIES98)

For the indicator absolute diabetes risk, only people without known diabetes as well as complete information on all GDRS components were considered:

- ▶ GNHIES98: n = 6,750 people without known diabetes
- ▶ DEGS1: n = 6,524 people without known diabetes

Calculation

- ▶ **Description:** For the indicator, the figures for total, women and men are provided and are stratified by age group, residential area and education as far as the number of cases available for the figure is ≥ 5 and the statistical uncertainty in the estimate of the indicator is not considered too large (a coefficient of variation $\leq 33.5\%$).
- ▶ **Stratification:** The geographical classification of the residence of the participating person was carried out by region (north east, north west, middle east, middle west and south). Educational status was determined using the Comparative Analysis of Social Mobility in Industrial Nations (CASMIN) index, which takes information on both school and vocational training into account and allows a categorisation into a low, medium and high education group.
- ▶ **Weighting:** In order to correct for deviations from the underlying reference population due to different participation rates or sampling probabilities, weighting factors were used when calculating the indicator. These adjust the surveys to the population structure of the reference population with regard to sex, age, federal state, German citizenship (yes/no), community type and education as of 31 December 1997 (GNHIES98) and 31 December 2010 (DEGS1). In DEGS1, the different participation probability of re-participants from GNHIES98 was also taken into account in the weighting.
- ▶ **Age standardisation:** Age standardisation and trend weighting was carried out by calculating the weighting factor in GNHIES98 using the age, sex and federal state structure of the reference population as of 31 December 2010.

Data quality

RKI interview and examination surveys provide representative results for the 18- to 79-year-old resident population of Germany. The population aged 80 years and over will only be included in future survey waves. As is the case in all population-based studies, underrepresentation of the seriously ill and those living in institutions must be assumed.

Data download

Robert Koch Institute. (2024). Results of the National Diabetes Surveillance 2015 – 2024 [Data set]. Zenodo. <https://doi.org/10.5281/zenodo.14935276> (in German)

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4. Tönnies T, Heidemann C, Paprott R, Seidel-Jacobs E, Scheidt-Nave C, Brinks R, et al. Estimating the impact of tax policy interventions on the projected number and prevalence of adults with type 2 diabetes in Germany between 2020 and 2040. *BMJ Open Diabetes Res Care.* 2021;9(1). doi: 10.1136/bmjdr-2020-001813.

External links

- ▶ Robert Koch Institute. Information on the German Health Interview and Examination Survey for Adults (DEGS) 2013 [cited 30.01.2025]. Available from: https://www.rki.de/EN/Topics/Noncommunicable-diseases/Health-surveys/Studies/DEGS/degs_content.html?nn=16782096.
- ▶ German Institute of Human Nutrition Potsdam-Rehbruecke (DIfE). DIfE – German Diabetes Risk Score [cited 07.08.2024]. Available from: <https://www.dife.de/en/news/diabetes-risk-score/>.
- ▶ Heidemann C, Du Y, Baumert J, Paprott R, Lampert T, Scheidt-Nave C. Social inequality and diabetes mellitus – developments over time among the adult population in Germany. *J Health Monit.* 2019;4(2):12-30. <https://doi.org/10.25646/5986>.

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