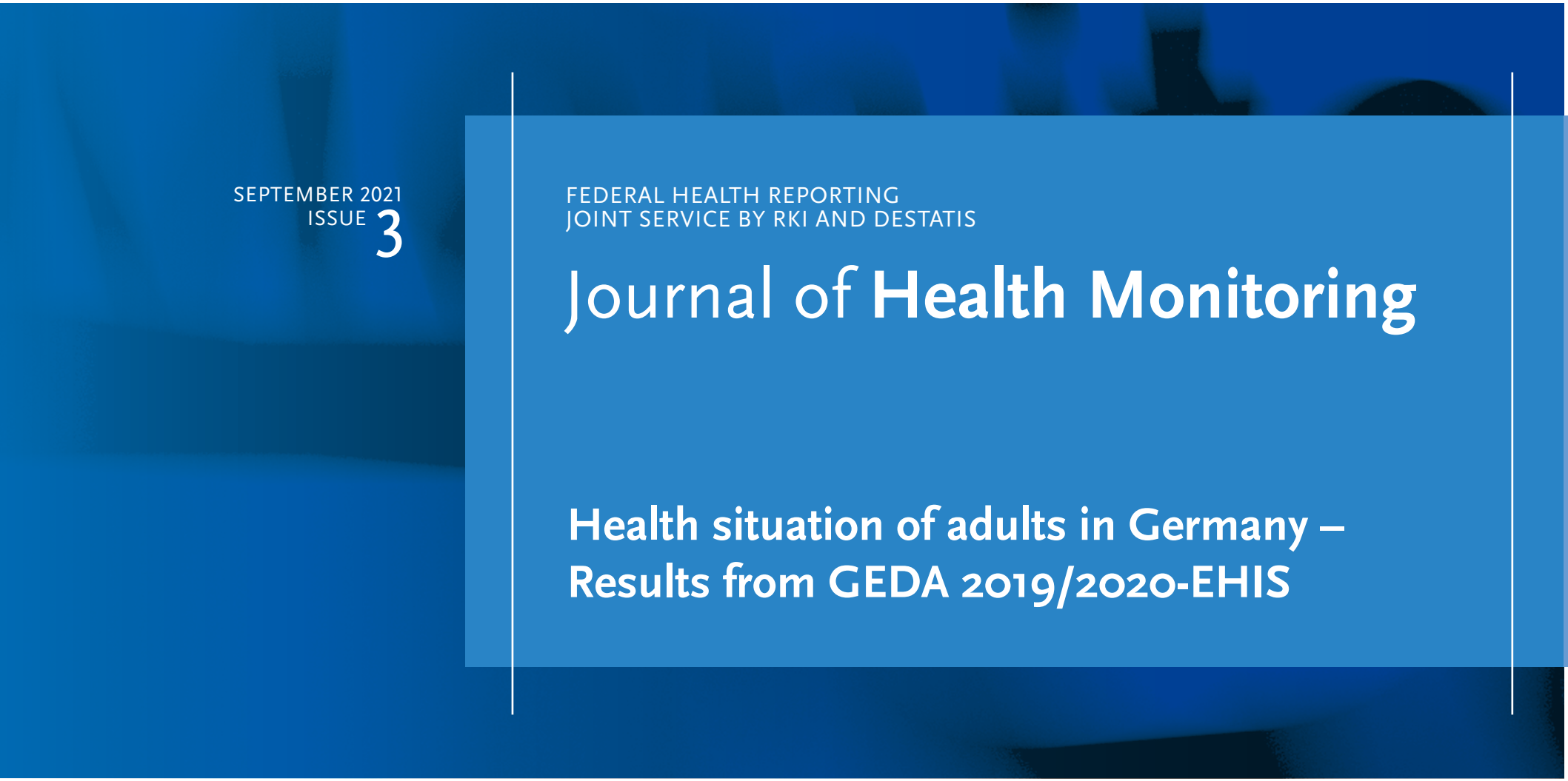
ROBERT KOCH INSTITUT



SEPTEMBER 2021
ISSUE 3

FEDERAL HEALTH REPORTING
JOINT SERVICE BY RKI AND DESTATIS

Journal of **Health Monitoring**

Health situation of adults in Germany – Results from GEDA 2019/2020-EHIS

Index

Health situation of adults in Germany – Results from GEDA 2019/2020-EHIS

Journal of Health Monitoring · 2021 6(3)
DOI 10.25646/8459
Robert Koch Institute, Berlin

Christin Heidemann, Christa Scheidt-Nave, Ann-Kristin Beyer, Jens Baumert, Roma Thamm, Birga Maier, Hannelore Neuhauser, Judith Fuchs, Ronny Kuhnert, Ulfert Hapke

Robert Koch Institute, Berlin
Department of Epidemiology and Health Monitoring

Submitted: 06.05.2021
Accepted: 09.08.2021
Published: 15.09.2021

Health situation of adults in Germany – Results for selected indicators from GEDA 2019/2020-EHIS

Abstract

In this article, we examine selected health indicators for the adult population aged 18 years and older in Germany (n=22,708) from the German Health Update (GEDA 2019/2020-EHIS) conducted between April 2019 and September 2020. These indicators include those of self-assessed health and depressive symptoms as well as chronic physical diseases and conditions. In young adulthood (18 to 44 years), over 80% of participants report good or very good subjective health. During this phase of life, most chronic diseases and conditions are rare, although allergies are frequent, and bronchial asthma and depressive symptoms are not uncommon. From mid adulthood (45 years and older), there is a gradual increase in the prevalence of chronic diseases such as cardiovascular disease, diabetes, chronic obstructive pulmonary disease and osteoarthritis. Over 60% of older adults (65 years and older) report a chronic disease or long-term health problem, while only half continue to report good or very good subjective health. During this stage of life, allergies and depressive symptoms become less prevalent. For some diseases, there are also differences according to gender and level of education. This article demonstrates the high public health relevance of age-associated chronic physical diseases and health related limitations in everyday life in an ageing society as well as the need to provide care for certain health conditions already in young adulthood.

SUBJECTIVE HEALTH · DEPRESSIVE SYMPTOMS · CHRONIC DISEASES · HEALTH MONITORING

1. Introduction

As a population-representative health survey of the adult population in Germany, the German Health Update (GEDA) is an important component of continuous health monitoring at the Robert Koch Institute (RKI) [1]. Since 2014/2015, the questionnaire of the European Health Interview Survey (EHIS), which is conducted every five years to assess the health situation of the population aged 15 years and older, has been incorporated into GEDA [2]. The GEDA part on health problems and diseases focuses on self-assessed general health, health disorders and the resulting limitations in everyday life as well as mental health and common non-communicable diseases. The reason for this focus lies in the fact that chronic conditions and non-communicable diseases and their risk factors dominate morbidity and mortality in European countries and interact with the persistent threat from infectious diseases [3]. For example, the widespread prevalence of non-communicable diseases, multimorbidity and frailty in the population has contributed

GEDA 2019/2020-EHIS

Fifth follow-up survey of the German Health Update

Data holder: Robert Koch Institute

Objectives: Provision of reliable information on the health status, health behaviour and health care of the population living in Germany, with the possibility of European comparisons

Study design: Cross-sectional telephone survey

Population: German-speaking population aged 15 and older living in private households that can be reached via landline or mobile phone

Sampling: Random sample of landline and mobile telephone numbers (dual-frame method) from the ADM sampling system (Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V.)

Sample size: 23,001 respondents

Study period: April 2019 to September 2020

GEDA survey waves:
- GEDA 2009
- GEDA 2010
- GEDA 2012
- GEDA 2014/2015-EHIS
- GEDA 2019/2020-EHIS

Further information in German is available at www.geda-studie.de

to the severe health consequences of the current global COVID-19 pandemic [4, 5]. Conversely, we cannot rule out the possibility that chronic health issues will increase at the population level in the context of the pandemic. These could include complications following infection with SARS-CoV-2 and indirect health consequences of the pandemic caused by restricted social contact and by other non-pharmaceutical measures of infection control [6–8]. This reinforces the demands of international health organisations for targeted health surveillance to prevent and control non-communicable diseases and to promote physical and mental health on a national and global level [9, 10].

The standardised EHIS questionnaire, approved at European level, comprises four modules for collecting data on health status, health determinants, health care and sociodemographic background [2]. The Minimum European Health Module (MEHM) consists of three main health status indicators: self-assessment of general health (subjective health), presence of chronic diseases or long-term health problems, and presence of health-related limitations in usual everyday activities [11]. The information collected in GEDA can be used to monitor further indicators, including individual chronic diseases, accidents and injuries, depressive symptoms and functional aspects of health such as pain, restrictions to mobility and the need for help in everyday life [2].

Based on data from GEDA 2019/2020-EHIS, this article provides an initial overview of the current health of adults in Germany using selected indicators. The data collection was conducted between April 2019 and September 2020 and thus includes the period of severe contact restrictions imposed in response to the COVID-19 pandemic between mid-March and early June 2020. However, this article aims to assess the health situation over the entire survey period. Findings on the above-mentioned indicators of health status, chronic non-communicable diseases of particular public health relevance and depressive symptomatology as an indicator of mental health are differentiated by age group and gender with the goal of mapping health within different phases of adulthood. Differences in education are reported in relation to health inequalities.

2. Methodology

2.1 Study design and sample

The German Health Update (GEDA) is a cross-sectional survey based on a nationwide sample of the resident population in Germany. The GEDA study has been conducted by the Robert Koch Institute (RKI) on behalf of the German Federal Ministry of Health at multi-year intervals since 2008 and is part of the health monitoring at the RKI [1, 12]. The fifth follow-up survey, GEDA 2019/2020-EHIS, took place between April 2019 and September 2020. As in the 2014/2015 wave, the questionnaire of the European Health Interview Survey (EHIS) was fully integrated [2, 13]. GEDA 2019/2020-EHIS was conducted as a telephone interview survey using a computer assisted, fully structured interview (i.e. Computer Assisted Telephone Interview, CATI). It was based on a random sample of landline and mobile telephone numbers (dual-frame method) [14]. The target population comprised the population aged 15 years and older living in private households and with permanent residency in Germany. A total of 23,001 people provided complete interviews. GEDA 2019/2020-EHIS used gender identities

to describe gender differences and allowed the respondents to indicate which gender they feel they belong to. Respondents 15 years and older included 12,101 women and 10,838 men. 62 respondents provided a different gender identity to the one that they were assigned at birth or gave no information. These individuals are not included in the gender stratified analyses. Based on the standards of the American Association for Public Opinion Research (AAPOR), the response rate was 21.6% (RR3) [15]. A detailed description of the methodology used for GEDA 2019/2020-EHIS, including a differentiated presentation of the response rates, can be found in Allen et al. in this issue of the Journal of Health Monitoring [16].

2.2 Indicators

Self-assessed health status

Data on three health status indicators were collected as part of the MEHM and as a central component of all national health surveys in the European Union [11, 17]. The indicator for subjective health is measured with the following question on self-assessed general health, as recommended by the World Health Organization (WHO): 'How is your health in general?'. Participants were asked to choose one of five response options: 'very good', 'good', 'fair', 'bad' or 'very bad'. The nationwide health monitoring defines the answers 'very good' or 'good' as a positively perceived subjective health. The indicator for a chronic disease or long-term health problem was collected via the following question: 'Do you have any chronic disease or a long-term health problem? This means diseases or health problems that have lasted or are expected to last for at least 6 months'. The response options were 'yes', 'no' or 'don't know'. The indicator for health-related limitations in usual everyday activities (Global Activity Limitation Indicator, GALI) was measured using a two-stage approach. The initial question was: 'Are you limited by a health problem in activities of your normal everyday life? Would you say you are...' with the response options being '... severely limited', '... moderately limited' and '... not limited'. Respondents who gave one of the first two response options were asked further: 'How long have you been limited?'. Response options were 'less than 6 months' and '6 months or longer'.

Depressive symptoms

The presence of depressive symptoms in the past two weeks was used as an indicator of mental health and was recorded via participants' self-assessment using the internationally established 8-item Patient Health Questionnaire (PHQ-8) [18]. With this questionnaire, the symptoms of major depression occurring in the past two weeks are rated according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 4th edition [19]) as 'not at all', 'several days', 'more than half of the days' or 'nearly every day'. The presence of depressive symptoms is assumed from a sum score of at least ten of the maximum of 24 points.

Chronic physical diseases and health conditions

Data on the 12-month prevalence of chronic diseases and health problems are based on responses to the following question: 'This section deals with lasting diseases and chronic health problems. Please do not include temporary health problems. In the past 12 months, have you had any of the following diseases or health problems?'. A list

included in the questionnaire asked specific questions about individual diseases and complaints, with possible answers being 'yes', 'no' or 'don't know'. This article considers the information collected on diabetes mellitus (queried as 'diabetes, not gestational diabetes'), coronary heart disease (CHD, queried as 'heart attack', 'chronic consequences of heart attack' and 'coronary heart disease or angina pectoris'), stroke or chronic consequences of stroke (queried as 'stroke' and 'chronic consequences of stroke'), chronic obstructive pulmonary disease (COPD, queried as 'chronic bronchitis, chronic obstructive pulmonary disease, emphysema'), bronchial asthma (queried as 'asthma, including allergic asthma'), allergies (queried as 'allergies such as hay fever, allergic reactions of the eyes or skin, food allergies or other allergies, not including allergic asthma') and osteoarthritis (queried as 'osteoarthritis, not including rheumatoid arthritis or joint inflammation').

2.3 Statistical analyses

The analyses are based on data from 22,708 participants aged between 18 and 99 years (11,959 women, 10,687 men, and 62 participants who reported a different or no gender identity). For each indicator, participants who did not provide information for the variables on which a specific indicator is based were excluded from the analyses (12 for subjective health, 69 for chronic disease/long-term health problem, 57 for long-term health-related limitation in everyday activities, 447 for depressive symptoms, 34 for diabetes, 122 for CHD, 16 for stroke/chronic consequence of stroke, 26 for bronchial asthma, 42 for COPD, 85 for allergies and 159 for osteoarthritis). The results are presented as prevalence in percentages with a 95% confidence interval (95% CI) for women and men separated by age group (18- to 29-year-olds, 30- to 44-year-olds, 45- to 64-year-olds, 65- to 79-year-olds, and at least 80 year-olds) and according to education level (International Standard Classification of Education, ISCED: low, medium and high education group).

The analyses were carried out using a weighting factor to correct for deviations of the sample from the population structure. Design weighting was first carried out for the different selection probabilities (mobile and landline). This was followed by an adjustment to the official population figures based on age, sex, federal state and district type (as of 31 December 2019). Adjustments were also undertaken to ensure the data reflected the education distribution identified by the 2017 microcensus. This was conducted in accordance with ISCED classifications [20].

The analyses were carried out with SAS 9.4. In order to take the weighting appropriately into account when calculating the confidence intervals and p-values, all analyses were calculated using the SAS survey procedures. A statistically significant difference between groups is assumed if the corresponding p-value in the Rao-Scott Chi-Square test is less than 0.05.

3. Results

3.1 Self-assessed health status

Overall, 69.9% (95% CI 69.0%–70.9%) of participants rated their subjective health as very good or good, with the proportion of women (68.6%) being slightly lower than that of men (71.6%). Both genders perceived their health

considerably poorer with increasing age (Table 1). Thus, in the youngest age group (18 to 29 years), 87.2% of women and 88.3% of men regarded their health as very good or good compared to 42.5% of women and 52.6% of men in the oldest age group (80 years and older).

49.2% (95% CI 48.2%–50.2%) of the participants reported a chronic disease or a long-term health problem; this proportion was slightly higher for women (51.9%) than for men (46.4%). The corresponding proportion increased with increasing age from 33.8% for women and 25.8% for men in the youngest age group to 61.9% for women and 62.0% for men in the oldest age group.

Long-term health-related limitations in usual everyday activities were reported by 33.4% (95% CI 32.4%–34.4%) of the participants. The prevalence was higher for women (35.5%) than for men (31.0%). A substantial increase in the

Subjective health is rated less favourably with increasing age, with fewer women than men reporting their subjective health as good or very good.

	Subjective health (very good or good)		Chronic disease or health problem (at least six months)		Health-related limitation in usual everyday activities (severe or moderate, at least six months)	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
Women (total)	**68.6**	**(67.2–69.9)**	**51.9**	**(50.6–53.3)**	**35.5**	**(34.2–36.9)**
Age group						
18–29 years	87.2	(83.5–90.1)	33.8	(29.8–38.0)	16.8	(13.7–20.5)
30–44 years	82.9	(80.1–85.3)	40.9	(37.8–44.0)	21.3	(18.7–24.2)
45–64 years	66.0	(63.9–68.1)	58.6	(56.6–60.6)	39.2	(37.2–41.3)
65–79 years	55.3	(52.6–57.9)	61.9	(59.4–64.5)	46.1	(43.5–48.8)
≥80 years	42.5	(37.9–47.3)	61.9	(57.0–66.6)	63.2	(58.5–67.7)
Education level						
Low education group	53.5	(49.5–57.5)	56.1	(52.0–60.1)	47.3	(43.3–51.3)
Medium education group	69.1	(67.5–70.7)	53.0	(51.3–54.7)	35.3	(33.7–37.0)
High education group	82.1	(80.6–83.4)	45.2	(43.3–47.1)	24.5	(23.0–26.1)
Men (total)	**71.6**	**(70.2–72.9)**	**46.4**	**(44.9–47.8)**	**31.0**	**(29.7–32.4)**
Age group						
18–29 years	88.3	(85.2–90.8)	25.8	(22.6–29.2)	10.5	(8.4–13.1)
30–44 years	84.0	(81.2–86.4)	34.6	(31.6–37.8)	18.5	(16.0–21.3)
45–64 years	65.2	(62.8–67.5)	53.1	(50.8–55.4)	38.8	(36.5–41.3)
65–79 years	57.7	(54.6–60.8)	63.8	(60.9–66.7)	42.9	(39.9–46.0)
≥80 years	52.6	(47.1–58.0)	62.0	(56.6–67.1)	58.1	(52.6–63.4)
Education level						
Low education group	63.8	(58.5–68.8)	49.1	(43.8–54.4)	39.4	(34.2–44.8)
Medium education group	68.3	(66.4–70.2)	48.0	(46.0–50.1)	33.3	(31.4–35.3)
High education group	81.2	(80.0–82.3)	42.3	(40.8–43.9)	23.1	(21.9–24.5)

CI=confidence interval

Table 1
Prevalence of subjective health rated as very good or good (n=11,953 women, n=10,681 men), of chronic diseases or long-term health problems (n=11,916 women, n=10,662 men) and long-term health-related limitations in usual everyday activities (n=11,929 women, n=10,664 men) by gender, age and education level
Source: GEDA 2019/2020-EHIS

Table 2
Prevalence of depressive symptoms in the past two weeks based on PHQ-8 by gender, age and education level (n=11,703 women, n=10,503 men)
Source: GEDA 2019/2020-EHIS

	Depressive symptoms (in the past two weeks)	
	%	(95% CI)
Women (total)	**8.8**	**(8.0–9.7)**
Age group		
18–29 years	11.6	(8.8–15.1)
30–44 years	8.7	(6.8–10.9)
45–64 years	10.2	(8.8–11.7)
65–79 years	5.0	(3.9–6.3)
≥80 years	7.3	(4.9–10.7)
Education level		
Low education group	13.0	(10.4–16.1)
Medium education group	8.5	(7.4–9.6)
High education group	5.7	(4.8–6.8)
Men (total)	**7.5**	**(6.7–8.5)**
Age group		
18–29 years	7.3	(5.3–10.0)
30–44 years	7.3	(5.5–9.5)
45–64 years	9.6	(8.0–11.5)
65–79 years	4.4	(3.1–6.3)
≥80 Jahre	5.8	(3.8–8.7)
Education level		
Low education group	13.4	(9.9–17.9)
Medium education group	8.4	(7.1–9.8)
High education group	3.4	(2.8–4.0)

CI=confidence interval, PHQ-8=8-item Patient Health Questionnaire

prevalence of health-related limitations can be seen with increasing age, from 16.8% for women and 10.5% for men in the youngest age group to 63.2% for women and 58.1% for men in the oldest age group.

For all three indicators, there is a pronounced educational gradient, particularly for women, with a lower prevalence of very good or good subjective health and a higher prevalence of chronic diseases or long-term health problems as well as of long-term health-related limitations in everyday life in the low education group compared to the high education group. Such a pattern largely persists across the age groups (Annex Table 1).

3.2 Depressive symptoms

Depressive symptoms are more prevalent in young and mid-adulthood.

A total of 8.3% (95% CI 7.7%–9.0%) of adults reported depressive symptoms within the previous two weeks. 8.8% of women and 7.5% of men are affected (Table 2). In the youngest adult age group (up to 29 years), more women tend to be affected. Depressive symptoms were least likely to be reported in the 65- to 79-year-old age group. For both women and men, the frequency of depressive symptoms decreases with higher levels of education. Compared to the high education group, almost three times as many women in the lower education group and four times as many men are affected by depressive symptoms. An analysis of depressive symptoms by age and education group (Annex Table 2) shows that the differences between the genders diminish with increasing age and higher education.

3.3 Chronic physical diseases and health conditions

Cardiometabolic diseases

Overall, 8.9% (95% CI 8.4%–9.5%) of adults reported the presence of diabetes mellitus (excluding gestational diabetes) in the past twelve months, with the prevalence for women (8.2%) being lower than for men (9.6%) (Table 3). In young adulthood (up to 44 years of age), the prevalence for both women and men is still below 3.5%, but then rises

Table 3
12-month prevalence of diabetes (n=11,942 women, n=10,671 men), coronary heart disease (n=11,904 women, n=10,621 men) and stroke or consequences of stroke (n=11,953 women, n=10,678 men) by gender, age and education level
Source: GEDA 2019/2020-EHIS

	Diabetes		Coronary heart disease		Stroke	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
Women (total)	**8.2**	**(7.5–9.1)**	**5.1**	**(4.5–5.7)**	**2.1**	**(1.7–2.6)**
Age group						
18–29 years	0.8[1]	(0.2–2.6)	0.8[2]	(0.5–1.4)	0.6[2]	(0.2–1.4)
30–44 years	3.2	(2.1–4.9)				
45–64 years	7.1	(6.0–8.3)	3.6	(2.7–4.6)	1.9	(1.3–2.7)
65–79 years	17.0	(15.0–19.3)	9.2	(7.8–10.9)	3.9	(3.0–5.0)
≥80 years	17.9	(14.4–22.0)	18.9	(15.3–23.1)	5.5	(3.6–8.5)
Education level						
Low education group	13.5	(11.0–16.4)	9.8	(7.7–12.4)	3.9	(2.6–5.8)
Medium education group	7.9	(7.1–8.8)	4.3	(3.7–5.0)	1.9	(1.5–2.5)
High education group	3.9	(3.4–4.5)	2.3	(1.9–2.8)	0.9	(0.7–1.2)
Men (total)	**9.6**	**(8.8–10.5)**	**6.6**	**(5.9–7.4)**	**2.3**	**(1.9–2.8)**
Age group						
18–29 years	0.6	(0.3–1.2)	0.4[2]	(0.2–0.8)	0.1[1,2]	(0.0–0.4)
30–44 years	2.7	(1.7–4.3)				
45–64 years	11.2	(9.7–13.0)	6.4	(5.2–7.7)	2.4	(1.7–3.2)
65–79 years	20.0	(17.7–22.5)	16.5	(14.2–19.1)	6.2	(4.7–8.0)
≥80 years	22.3	(18.1–27.2)	21.9	(17.7–26.8)	5.9	(3.9–8.8)
Education level						
Low education group	8.8	(6.2–12.3)	6.5	(4.3–9.6)	2.1	(0.9–4.7)
Medium education group	10.8	(9.7–12.2)	7.1	(6.1–8.2)	2.6	(2.1–3.3)
High education group	7.6	(6.9–8.3)	5.8	(5.2–6.5)	1.8	(1.4–2.2)

CI=confidence interval
[1] Number of cases is n<10
[2] Estimate refers to the age group 18–44 years

The prevalences of diabetes, coronary heart disease, stroke and its sequelae as well as chronic obstructive pulmonary disease increase considerably from mid- to older adulthood and are lower or similar in women compared to men.

with age, reaching 17.9% in women and 22.3% in men in the oldest age group.

A total of 5.8% (95% CI 5.4%–6.3%) of adults reported CHD (i.e. heart attack, chronic consequences of a heart attack, coronary heart disease or angina pectoris) in the past twelve months, with the prevalence in women (5.1%) also lower than in men (6.6%). Cases of CHD are rare in young adulthood for both genders (less than 1%) and rise with age to 18.9% in women and 21.9% in men in the oldest age group.

A total of 2.3% (95% CI 2.0%–2.6%) of adults reported a stroke or chronic consequences of stroke in the past twelve months, with women (2.1%) and men (2.3%) showing similar prevalence estimates. In young adulthood, prevalence is still below 1% for both genders and then rises to 5.5% in women in the age group 80 years and older and to 6.2% in men aged 65 to 79 years.

For the cardiometabolic diseases under consideration, a clear educational gradient can be observed in women, with

Table 4
12-month prevalence of chronic obstructive pulmonary disease (n=11,940 women, n=10,665 men) and bronchial asthma (n=11,946 women, n=10,675 men) by gender, age and education level
Source: GEDA 2019/2020-EHIS

	Chronic obstructive pulmonary disease		Bronchial asthma	
	%	(95% CI)	%	(95% CI)
Women (total)	**6.5**	**(5.8–7.2)**	**9.1**	**(8.3–9.9)**
Age group				
18–29 years	1.2	(0.5–2.6)	7.4	(5.5–9.9)
30–44 years	3.9	(2.6–5.8)	8.5	(6.9–10.6)
45–64 years	7.7	(6.5–9.0)	10.7	(9.4–12.1)
65–79 years	9.0	(7.7–10.6)	8.6	(7.3–10.0)
≥80 years	10.9	(8.1–14.6)	7.9	(5.6–11.0)
Education level				
Low education group	9.4	(7.3–12.1)	10.0	(7.9–12.6)
Medium education group	6.4	(5.6–7.3)	9.0	(8.1–10.1)
High education group	3.4	(2.9–4.0)	8.1	(7.1–9.1)
Men (total)	**5.8**	**(5.1–6.6)**	**7.0**	**(6.3–7.7)**
Age group				
18–29 years	1.5	(0.8–2.9)	6.5	(4.9–8.5)
30–44 years	2.4	(1.5–3.7)	6.7	(5.4–8.3)
45–64 years	7.5	(6.1–9.1)	7.2	(6.0–8.7)
65–79 years	10.4	(8.4–12.7)	7.4	(5.9–9.1)
≥80 years	9.4	(6.7–13.0)	6.7	(4.5–10.0)
Education level				
Low education group	8.6	(6.0–12.4)	7.3	(5.0–10.5)
Medium education group	6.4	(5.4–7.5)	7.4	(6.4–8.6)
High education group	3.5	(3.1–4.1)	6.1	(5.4–6.9)

CI=confidence interval

The prevalence of asthma does not change with age, while the prevalence of allergies is highest in young and mid-adulthood; both of these chronic conditions are more prevalent in women than in men.

prevalence estimates around twice as high in the medium education group and around three times as high in the lower education group compared to the higher education group. In men, the lowest prevalence estimates are also found in the high education group, but the differences of the high education group with the medium and low education groups are much less pronounced and, in some cases, not statistically significant.

Diseases of the lower respiratory tract

A total of 6.1% (95% CI 5.6%–6.7%) of adults reported the presence of COPD in the past twelve months. Prevalences for women (6.5%) and men (5.8%) are similar (Table 4). COPD prevalence increases with age from less than 2% in both genders for the 18- to 29-year age group to 10.9% for women in the 80 years and older age group and 10.4% for men in the 65- to 79-year age group. Considerable differences regarding levels of education can be observed for both genders, with higher prevalences in the low and medium education groups compared to the high education group.

The prevalence of bronchial asthma (including allergic asthma) in the past twelve months for adults was 8.0% (95% CI 7.5%–8.6%), with women (9.1%) more frequently affected than men (7.0%). Prevalence estimates are similar for women and men across all age groups and no statistically significant differences by education group are evident.

Allergies

The presence of (any) allergy (except allergic asthma) in the past twelve months was reported by almost one-third of adults (30.9%, 95% CI 30.0%–31.8%), with women (34.7%) being affected more often than men (27.0%) (Table 5). An allergy was mainly reported in young and mid-adulthood (women up to 64 years, men up to 44 years). In addition, women in the high education group more frequently reported an allergy than women in the low education group.

Osteoarthritis

A total of 17.1% (95% CI 16.4%–17.8%) of adults reported having osteoarthritis in the past twelve months, with

Table 5 (left)
12-month prevalence of allergies by gender, age and education level (n=11,918 women, n=10,645 men)
Source: GEDA 2019/2020-EHIS

	Allergies	
	%	(95% CI)
Women (total)	**34.7**	**(33.4–36.0)**
Age group		
18–29 years	37.9	(33.8–42.1)
30–44 years	41.0	(37.9–44.1)
45–64 years	37.3	(35.3–39.3)
65–79 years	27.4	(25.2–29.7)
≥80 years	20.1	(16.5–24.2)
Education level		
Low education group	31.0	(27.4–34.8)
Medium education group	35.2	(33.6–36.9)
High education group	36.7	(34.9–38.5)
Men (total)	**27.0**	**(25.7–28.3)**
Age group		
18–29 years	39.3	(35.6–43.0)
30–44 years	32.7	(29.7–35.7)
45–64 years	23.9	(22.0–25.9)
65–79 years	17.3	(15.3–19.5)
≥80 years	16.1	(12.6–20.4)
Education level		
Low education group	25.6	(21.2–30.5)
Medium education group	26.4	(24.6–28.2)
High education group	28.9	(27.4–30.4)

CI=confidence interval

Table 6 (right)
12-month prevalence of osteoarthritis by gender, age and education level (n=11,859 women, n=10,630 men)
Source: GEDA 2019/2020-EHIS

	Osteoarthritis	
	%	(95% CI)
Women (total)	**21.6**	**(20.5–22.7)**
Age group		
18–29 years	1.1[1]	(0.4–2.9)
30–44 years	5.1	(3.8–6.7)
45–64 years	23.9	(22.1–25.8)
65–79 years	39.7	(37.2–42.4)
≥80 years	47.3	(42.4–52.1)
Education level		
Low education group	31.2	(27.7–34.9)
Medium education group	21.0	(19.8–22.4)
High education group	13.5	(12.5–14.6)
Men (total)	**12.4**	**(11.5–13.4)**
Age group		
18–29 years	1.1[1]	(0.5–2.6)
30–44 years	3.5	(2.5–5.1)
45–64 years	15.4	(13.8–17.2)
65–79 years	23.2	(20.7–26.0)
≥80 years	31.6	(26.7–36.9)
Education level		
Low education group	13.3	(10.0–17.4)
Medium education group	12.8	(11.5–14.1)
High education group	11.4	(10.5–12.3)

CI=confidence interval
[1] Number of cases is n<10

Osteoarthritis is one of the most common chronic diseases in the elderly population and is more prevalent in women than in men.

women (21.6%) being affected markedly more often than men (12.4%) (Table 6). For both genders, prevalence does not substantially exceed 5% in young adulthood, but then increases with age to 47.3% in the oldest women and 31.6% in the oldest men. While a clear educational gradient is evident for women with the lowest prevalence found in the high education group and the highest prevalence in the low education group, no such gradient is found for men.

4. Discussion

In this article, we present current data on selected indicators of physical and mental health among adults in Germany, which are collected every five years as part of EHIS integrated into the nationwide GEDA study.

The results are differentiated according to five age groups, each representing a phase of life, and by gender. From the age of 45 years, the prevalence of subjective health

assessed as good or very good declines substantially to 43% for women and 53% for men, and health-related limitations in usual everyday activities lasting at least six months rise considerably to 63% for women and 58% for men. The prevalence of having (any) chronic disease or long-term health problem for at least six months increases gradually with age in both genders. Among the individual chronic diseases examined, CHD, diabetes, COPD and osteoarthritis characteristically increase in middle age (45 years and older) for both genders, with 12-month prevalences in the oldest age group for both women and men of around 6% for stroke, around 20% for diabetes and CHD, around 10% for COPD and for osteoarthritis, 47% in women and 32% in men. In contrast, depressive symptoms in the previous two weeks are especially common in young and mid-adulthood with prevalences between 7% and 12% for both genders. A similar picture emerges for allergies, which, with a 12-month prevalence of around 40%, are most frequently reported by women in young and mid-adulthood and by men in young adulthood. Only bronchial asthma exhibits no significant differences in 12-month prevalence across the age range for both genders.

With the exception of bronchial asthma and allergies, all the health indicators considered show an educational gradient to the disadvantage of adults with lower levels of education. For most of the indicators, this is particularly pronounced in women, and for osteoarthritis, it only affects women. Conversely, a higher prevalence of allergies is observed in women with a high level of education.

4.1 Self-assessed health status

Subjective health primarily reflects how well a person feels. A less favourable self-assessment of health is associated with a higher prevalence of chronic diseases and health problems [21–23] and is also an important predictor of premature mortality [24]. Based on the present study, around 70% of all adults in Germany rate their subjective health as very good or good; about half report a chronic disease or a long-term health problem and a third report severe or moderate long-term health-related limitations in usual everyday activities, each of which have lasted at least six months. Over the course of life, subjective health is assessed more negatively as age increases, and the presence of chronic diseases or health problems as well as of health-related limitations are correspondingly reported more frequently. This pattern over the course of life points to the association between self-assessed subjective health and the actual state of health. Said differently, the more frequently people report chronic diseases, health problems or health-related limitations, the more negatively they assess their state of health; a finding that is also in line with other studies [21–23]. In comparison to earlier RKI surveys, the proportions of women and men with very good or good subjective health were similar in the three telephone surveys GEDA 2009 to 2012 and somewhat lower in GEDA 2014/2015-EHIS, which collected data in writing or online [25]. The collection of data for the indicators on chronic diseases and long-term health problems as well as on long-term health-related limitations in usual everyday activities differed in previous GEDA waves to the one used here, which limits the possibilities for comparisons over

time. In the present study, gender-, age- and education-specific differences in the prevalences of all three indicators were observed, which could enable approaches for the improvement of target group-specific prevention measures as well as health promotion and health care.

4.2 Depressive symptoms

Depressive symptoms not only occur with depression but can also be accompanying or secondary symptoms of other mental disorders or physical diseases or refer to subclinical forms of depression. It should therefore be noted that the PHQ-8 questionnaire-based indicator for depressive symptoms correlates with almost all domains of mental health and covers a total of eight symptom domains. For reasons of space, however, this article only presents the total score. Especially in young adulthood, women are more frequently affected by depressive symptoms. Earlier analyses of time trends have shown that there can be considerable changes within the different age groups. An analysis on major depression, for example, showed that the prevalence of depression among 18- to 34-year-old women almost doubled from 8.8% to 15.6% between 1998 and 2011, while the prevalence decreased from 9.8% to 5.0% among 50- to 65-year-old women [26]. Analyses of GEDA 2014/2015-EHIS data also showed that younger women are affected by depressive symptoms more frequently than older women [27]. The current analyses of self-reported depressive symptoms in the past two weeks replicate this finding, indicating entrenched risks for younger women. No obvious differences were observed for men in the age groups up to 64 years, as was also the case in GEDA 2014/2015-EHIS. Only in the age group 65 years and older does prevalence decrease, as it also does for women. Differences in the prevalence of depressive symptoms according to levels of education have tended to increase rather than decrease. Further in-depth trend analyses would be needed to determine whether this development is due to a worsening of the situation for people in the low education group or an improvement in the situation for higher education groups. The complexity of the possible backgrounds and causal relationships is discussed, for example, in the current Health Situation of Women in Germany Report [28] and the Focus Report on Mental Health [29] of the RKI. In any case, this is a possible indication that current preventive approaches, such as the expansion of the Occupational Health and Safety Act through risk assessment (sub-para. 6 in §5 of the Occupational Health and Safety Act, ArbSchG) should be reviewed to see how effectively they also reach the population with lower levels of education.

4.3 Chronic physical diseases and health conditions

Cardiometabolic diseases

The metabolic disease diabetes mellitus, which is characterised by a disturbance of blood sugar level regulation, plays an important role from mid-adulthood onwards. Thus, data on 12-month prevalence show that in the age range 45 to 64 years almost one in ten people and from 65 years even one in five people report a diabetes. Overall, women are affected less frequently than men, and the low and medium education groups are affected more often than the high education group. These age, gender and

education-specific differences have also been observed in previous studies [30–32]. Beyond the age of 45 years, diabetes usually develops as type 2 diabetes. Gestational diabetes, which becomes relevant for women in young adulthood, was explicitly excluded from the question in GEDA 2019/2020-EHIS. Also disregarded in the present study are undiagnosed cases of diabetes, which contribute around 2% to the overall prevalence of diabetes in the adult population [30]. While the prevalence of undiagnosed diabetes has decreased over the past few decades, the prevalence of diagnosed diabetes has increased [33]. The current prevalence estimate is also slightly higher than that reported by GEDA 2014/2015-EHIS [31]. This may be due to various factors, such as an earlier diagnosis of diabetes, improved care for diagnosed cases and the demographic ageing of the population [33]. As described in the context of the diabetes surveillance in Germany established at the RKI, diabetes and its concomitant and secondary diseases adversely impact quality of life, reduce a person's healthy life years and lower life expectancy [34, 35]. For this reason, in addition to optimal medical care oriented to the needs of those affected, increased primary preventive behavioural and settings-based measures are necessary to prevent the development of diabetes and consequently to reduce the prevalence of diabetes in the population.

With almost three million cases, diseases of the circulatory system were the most common reason for hospitalisation in 2019 and with over 330,000 deaths, they were also the most common cause of death. Cardiovascular diseases were not surveyed comprehensively in the context of GEDA 2019/2020-EHIS, but only on the basis of the defined EHIS indicators. The 12-month CHD prevalence of 5.1% for women and 6.6% for men described here differ slightly from the age-standardised CHD prevalence of 3.9% for women and 8.0% for men calculated on the basis of the 2018 ambulatory claims data [36]. This difference could be caused by the relatively low case number for men from the low education group in GEDA, which may have led to an underestimation of CHD prevalence in men. This small number of cases may also have contributed to the study result that the known social status gradient for CHD is not pronounced among men, although it is clearly evident in women [37]. As both the cited study and GEDA data show, men are more likely to develop CHD than women. This has been observed in many studies [38]. In GEDA 2019/2020-EHIS, 2.1% of women and 2.3% of men answered yes to the question of whether they had had a stroke or chronic consequences of stroke in the past twelve months. These prevalence estimates were slightly lower in GEDA 2014/2015-EHIS [39], but due to the methodological differences between the two surveys, comparisons should be interpreted with caution. Furthermore, as expected, the 12-month prevalence is lower than the lifetime prevalence of stroke in 40- to 79-year-old women (2.5%) and men (3.3%), which was surveyed in the German Health Interview and Examination Survey for Adults (DEGS1, 2008–2011) [40]. As in previous surveys, there is also an age and education gradient for stroke [39] that is less pronounced than in CHD. Limiting factors here are the low participation rate for men with low levels of education and the question of whether the EHIS indicator is suitable for recording stroke prevalence in the population in a European comparison, as already discussed in regard to GEDA 2014/2015-EHIS [39]. Data on cardiovascular

diseases, such as those collected here, help to determine the extent of the diseases within the population, to plan targeted prevention and care services and to monitor their effects.

Diseases of the lower respiratory tract

Irreversible and chronically progressive damage to the lung tissue in COPD leads to a permanent narrowing of the airways, overinflation of the lungs and obstruction of gas exchange, resulting in shortness of breath. Because COPD is difficult to assess, GEDA uses a variety of terms in its question (chronic bronchitis, chronic obstructive pulmonary disease, emphysema) in accordance with international epidemiological studies [41]. It should be noted that self-reports lead to considerably lower prevalence estimates of COPD than those based on pulmonary function tests, which can detect early stages [41]. The indicator used in GEDA 2019/2020-EHIS was also used in GEDA 2014/2015-EHIS. Although a direct comparison between the two survey waves is limited, mainly due to changes in sampling design, the results are very similar, particularly for men, and show 12-month prevalence estimates rising from the age of 45 years for both genders [41]. As expected, there are educational differences in the prevalence of COPD for both genders, reflecting inequalities in terms of the major risk factors (i.e. tobacco and pollutant exposure). For women, the prevalence has increased in comparison to GEDA 2014/2015-EHIS [41]. This most likely reflects gender-related changes in smoking behaviour, with a decrease in the proportion of male smokers and a further long-term increase in the proportion of female smokers. A convergence of COPD mortality rates in women and men, as well as of incidence and mortality rates from malignant tumours of the lungs, bronchi and trachea, has been observed for some time [42]. COPD is one of the leading causes of premature mortality, diminished quality of life and health-related impairment when performing everyday activities [41]. At an epidemiological level, this means that continuous health monitoring and embedding COPD in NCD surveillance are central building blocks for the promotion of public health.

Bronchial asthma is a chronic respiratory disease characterised by symptoms such as wheezing, shortness of breath and breathlessness, as well as a feeling of tightness in the chest or coughing. Similar to allergies, a number of disease mechanisms play a role in asthma, and there are allergic and non-allergic forms [43]. The current study indicates no variation by age in the overall 12-month prevalence of asthma in adults (8%), yet there is a gender difference already documented in numerous epidemiological studies, with women affected more frequently (9% versus 7% in men). In addition to this gender difference, the present study shows a known tendency toward higher prevalence estimates in lower education groups, although this is not statistically significant. The prevalence of asthma in GEDA 2014/2015-EHIS was slightly lower [44]. Bronchial asthma is one of the most common chronic diseases worldwide. Increasing numbers of people are affected, necessitating further efforts in prevention, diagnosis and care.

Allergies

Allergy symptoms such as a runny nose, fits of sneezing, burning and watery eyes, breathing difficulties and even breathlessness or severe itching of the skin are caused by

excessive reactions of the immune system to substances (allergens) in the environment that are harmless in themselves. At a clinical level, there are diverse disease entities, for example, allergic rhinitis (hay fever), allergic bronchial asthma, atopic dermatitis, allergic contact eczema and food allergy [45]. The allergies indicator presented in this article (in contrast to reported medical diagnoses) maps the self-assessment of being currently (i.e. in the twelve months prior to the survey) affected by (any) allergic disease other than bronchial asthma. The results show that almost one-third of adult women and men in Germany are affected by allergies. Compared to the previous GEDA study (GEDA 2014/2015-EHIS), the overall 12-month prevalence of allergies has increased [46]. As expected, women (35%) are affected more frequently than men (27%). The higher prevalence of allergies observed among women with a higher level of education is also well-documented, while aspects of socialisation, awareness and use of medical services are of particular importance. A differentiated survey of individual allergic conditions would enable more specific analyses of associated factors such as age, gender and level of education. It is being discussed that for people who suffer from allergies, structural improvements to the health care system, such as a structured treatment programme for allergies (disease management programme, DMP), analogous to those for asthma and COPD, would be very helpful [45].

Osteoarthritis

Osteoarthritis is a degenerative disease of the joint cartilage that affects the adjacent muscles, joint capsules and ligaments [47]. Osteoarthritis is particularly widespread in the elderly population and is one of the most common diseases in old age. Compared to the results from GEDA 2014/2015-EHIS, the 12-month prevalence of osteoarthritis has remained fairly stable [48]. Women suffer from osteoarthritis significantly more often than men; the causes of this can be hormonal, metabolic or diet-related differences [49]. The clearly pronounced educational gradient found in women potentially indicates a connection between heavy physical labour and the development of osteoarthritis [50, 51]. The pain and loss of function associated with osteoarthritis can lead to a reduction in quality of life. Preventive measures include avoiding being overweight or overworking the joints [50, 51].

4.4 Strengths and limitations

The short reference period of the EHIS indicators, which were introduced to harmonise European health monitoring [13, 17], as well as the high number of cases surveyed in GEDA 2019/2020-EHIS enable the assessment of current mental and physical burdens and subjective health for adults in Germany as well as showing the patterns specific to different life stages. However, the relatively short reference period and the self-assessment of the considered EHIS indicators lead to prevalence estimates that are considerably different in some cases to those found in other health monitoring studies and epidemiological studies, which usually survey the lifetime prevalence of physician-diagnosed diseases based on medical interviews or examinations.

When comparing prevalences found in GEDA 2019/2020-EHIS and GEDA 2014/2015-EHIS, which was conducted five years earlier, the differences in study design must be taken into account, despite the largely identical operational-

isation of most indicators, as they may have led to differences in the participants involved (for example, differences in the distribution of participants by education level). While GEDA 2014/2015-EHIS utilised paper and online questionnaires that were completed by each participant based on a population registry sample [2], GEDA 2019/2020-EHIS was conducted as a telephone interview survey based on a random sample of landline and mobile phone numbers [16]. Despite weighting the respective study population by age, sex, region and education level according to the composition of the population at the time of the survey – an approach discussed in more detail in relation to GEDA 2019/2020-EHIS in an article by Allen et al. in this issue of the Journal of Health Monitoring [16] – deviations in the study population with regard to other characteristics cannot be ruled out. Comparability with earlier GEDA survey waves (Infobox) conducted as telephone surveys on the basis of random samples of landline numbers is also limited as operationalisation of most indicators differ from those of the EHIS surveys. Furthermore, the GEDA 2019/2020-EHIS survey period partly coincided with the COVID-19 pandemic. The present results are based on the assumption that the sample was not systematically biased by the measures to contain the COVID-19 pandemic. Moreover, initial analyses do not reveal a systematic selection bias between the subsamples from the comparison periods April 2019 to mid-March 2020 (onset of extensive measures to contain the pandemic) and mid-March to September 2020. Nevertheless, a change in willingness to participate and its effect on the results cannot be completely ruled out. The uptake of shorter working hours and an increase in flexible working from home solutions, for example, may have made individual population groups easier (or harder) to reach by telephone.

The present study includes indicators that were selected because of their relatively high prevalence in the population and that also represent a broad spectrum of health complaints. When interpreting the results, it should be noted that the indicators occur within different time frames.

4.5 Conclusion

The current nationwide health monitoring data from GEDA 2019/2020-EHIS presented here demonstrate that age-related, non-communicable diseases and health-related limitations in usual everyday activities are of high public health relevance in a society faced with demographic change. A comprehensive need to provide care for health problems is nevertheless not limited to the elderly. Allergies and depressive symptoms are particularly prevalent among women and men in young and mid-adulthood, and bronchial asthma occurs with similar frequency across all age groups. Today as in the past, levels of education reflect differences in the prevalence of good subjective health, depressive symptoms, health-related limitations in everyday life and those non-communicable diseases that are among the leading causes of premature mortality, especially cardiovascular diseases, diabetes and COPD. With a knowledge of key avoidable risk factors common to these diseases, nationwide health monitoring has the task of mapping the development of risk factors and resources as well as measures to promote healthy behaviour and a healthy living environment in a timely manner. International health targets such as the sustainability goals of the

United Nations 2030 Agenda can serve as a guideline here, but they must be geared toward the specific challenges of each country and region [52]. Preventive measures must above all be reviewed to determine how well they also reach disadvantaged groups such as people with lower levels of education. Health monitoring in this context has the important task of ensuring methodological comparability over time. It was not possible to conduct a regionalised analysis at the federal state level based on this initial evaluation. In future, GEDA offers the prospect of further expanding regionalised data analyses so as to enable more detailed sub-regional analyses in collaboration with the federal states. European comparisons will be possible in the future when all European data from this wave of the EHIS survey become available.

Corresponding author
Dr Christin Heidemann
Robert Koch Institute
Department of Epidemiology and Health Monitoring
General-Pape-Str. 62–66
12101 Berlin, Germany
E-mail: HeidemannC@rki.de

Please cite this publication as
Heidemann C, Scheidt-Nave C, Beyer AK, Baumert J, Thamm R et al. (2021)
Health situation of adults in Germany – Results for selected indicators from GEDA 2019/2020-EHIS.
Journal of Health Monitoring 6(3):3–25.
DOI 10.25646/8459

The German version of the article is available at:
www.rki.de/journalhealthmonitoring

Data protection and ethics

GEDA 2019/2020-EHIS is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The Ethics Committee of the Charité – Universitätsmedizin Berlin assessed the ethics of the study and approved the implementation of the study (application number EA2/070/19).
Participation in the study was voluntary. The participants were informed about the aims and contents of the study and about data protection. Informed consent was obtained verbally.

Funding

GEDA 2019/2020-EHIS was funded by the Robert Koch Institute and the German Federal Ministry of Health.

Conflicts of interest

The authors declared no conflicts of interest.

Acknowledgment

The authors would like to thank Stefan Damerow, Jennifer Allen, Johannes Lemcke, Franziska Prütz and Alexander Rommel from the Department of Epidemiology and Health Monitoring at the Robert Koch Institute for providing text modules describing the GEDA 2019/2020-EHIS study as well as on the limitations that may result from the fact that the GEDA survey period also included the initial phase of the COVID-19 pandemic.

References

1. Lange C, Jentsch F, Allen J et al. (2015) Data Resource Profile: German Health Update (GEDA) – the health interview survey for adults in Germany. Int J Epidemiol 44(2):442–450
2. Lange C, Finger JD, Allen J et al. (2017) Implementation of the European health interview survey (EHIS) into the German health update (GEDA). Arch Public Health 75:40
3. Katzmarzyk PT, Salbaum JM, Heymsfield SB (2020) Obesity, noncommunicable diseases, and COVID-19: A perfect storm. Am J Hum Biol 32(5):e23484
4. Stefan N, Birkenfeld AL, Schulze MB (2021) Global pandemics interconnected – obesity, impaired metabolic health and COVID-19. Nat Rev Endocrinol 17(3):135–149
5. Clark A, Jit M, Warren-Gash C et al. (2020) Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: a modelling study. Lancet Glob Health 8(8):e1003–e1017
6. Chang AY, Cullen MR, Harrington RA et al. (2020) The impact of novel coronavirus COVID-19 on noncommunicable disease patients and health systems: a review. J Intern Med 289(4):450–462
7. Scheidt-Nave C, Barnes B, Beyer AK et al. (2020) Care for the chronically ill in Germany – The challenges during the COVID-19 pandemic. Journal of Health Monitoring 5(S10): 2–27. https://edoc.rki.de/handle/176904/7801 (As at 10.03.2021)
8. Gaertner B, Fuchs J, Möhler R et al. (2021) Older people at the beginning of the COVID-19 pandemic: A scoping review. Journal of Health Monitoring 6(S4):2–37. https://edoc.rki.de/handle/176904/8169 (As at 29.04.2021)
9. Kluge HHP, Wickramasinghe K, Rippin HL et al. (2020) Prevention and control of non-communicable diseases in the COVID-19 response. Lancet 395(10238):1678–1680
10. World Health Organization and the United Nations Development Programme (2020) Responding to non-communicable diseases during and beyond the COVID-19 pandemic. https://www.who.int/publications/i/item/WHO-2019-nCoV-Non-communicable_diseases-Actions-2020.1 (As at 10.03.2021)
11. Cox B, van Oyen H, Cambois E et al. (2009) The reliability of the Minimum European Health Module. Int J Public Health 54(2):55–60
12. Kurth BM, Lange C, Kamtsiuris P et al. (2009) Gesundheitsmonitoring am Robert Koch-Institut. Sachstand und Perspektiven. Bundesgesundheitsbl 52:557–570
13. European Commission, Eurostat (2018) European Health Interview Survey (EHIS wave 3). Methodological manual. European Commission, Luxembourg
14. von der Heyde C (2013) Das ADM-Stichprobensystem für Telefonbefragungen. https://www.gessgroup.de/wp-content/uploads/2016/09/Beschreibung-ADM-Telefonstichproben_DE-2013.pdf (As at 29.04.2021)
15. American Association for Public Opinion Research (AAPOR) (2016) Standard definitions – final disposition codes of case codes and outcome rates for surveys. AAPOR, Deerfield
16. Allen J, Born S, Damerow S et al. (2021) German Health Update (GEDA 2019/2020-EHIS) – Background and methodology. Journal of Health Monitoring 6(3):66–79. https://www.rki.de/johm-en-2021 (As at 15.09.2021)
17. Fehr A, Lange C, Fuchs J et al. (2017) Health monitoring and health indicators in Europe. Journal of Health Monitoring 2(1):3–21. https://edoc.rki.de/handle/176904/2595.2 (As at 15.03.2021)
18. Kroenke K, Strine TW, Spitzer RL et al. (2009) The PHQ-8 as a measure of current depression in the general population. J Affect Disord 114(1/3):163–173
19. American Psychiatric Association (1994) Diagnostic and Statistical Manual of Mental Disorders, Forth edition (DSM-IV). American Psychiatric Association, Washington, DC
20. Research Data Centres of the Federal Statistical Office and Statistical Offices of the Länder (2017) Microcensus 2017. DOI: 10.21242/12211.2017.00.00.1.1.1, own calculation
21. Wu S, Wang R, Zhao Y et al. (2013) The relationship between self-rated health and objective health status: a population-based study. BMC Public Health 13:320
22. Latham K, Peek CW (2013) Self-rated health and morbidity onset among late midlife U.S. adults. J Gerontol B Psychol Sci Soc Sci 68(1):107–116
23. Ul-Haq Z, Mackay DF, Pell JP (2014) Association between physical and mental health-related quality of life and adverse outcomes; a retrospective cohort study of 5,272 Scottish adults. BMC Public Health 14:1197
24. Lorem G, Cook S, Leon DA et al. (2020) Self-reported health as a predictor of mortality: A cohort study of its relation to other health measurements and observation time. Sci Rep 10(1):4886

25. Lampert T, Schmidtke C, Borgmann LS et al. (2018) The subjective health of adults in Germany. Journal of Health Monitoring 3(2):61–68. https://edoc.rki.de/handle/176904/5688 (As at 29.04.2021)

26. Bretschneider J, Janitza S, Jacobi F et al. (2018) Time trends in depression prevalence and health-related correlates: results from population-based surveys in Germany 1997–1999 vs. 2009–2012. BMC Psychiatry 18(1):394

27. Bretschneider J, Kuhnert R, Hapke U (2017) Depressive symptoms among adults in Germany. Journal of Health Monitoring 2(3):77–83. https://edoc.rki.de/handle/176904/2826 (As at 29.04.2021)

28. Robert Koch-Institut (Ed) (2020) Gesundheitliche Lage der Frauen in Deutschland. Gesundheitsberichterstattung des Bundes. Gemeinsam getragen von RKI und Destatis. RKI, Berlin. https://www.rki.de/DE/Content/Gesundheitsmonitoring/Gesundheitsberichterstattung/GBEDownloadsB/Gesundheitliche_Lage_der_Frauen_2020.pdf?__blob=publicationFile (As at 29.04.2021)

29. Robert Koch-Institut (Ed) (im Druck) Schwerpunktbericht zur psychischen Gesundheit der Bevölkerung in Deutschland. Teil 1 – Erwachsenenalter. Erkennen – Bewerten – Handeln. RKI, Berlin

30. Heidemann C, Du Y, Paprott R et al. (2016) Temporal changes in the prevalence of diagnosed diabetes, undiagnosed diabetes and prediabetes: findings from the German Health Interview and Examination Surveys in 1997–1999 and 2008–2011. Diabet Med 33(10):1406–1414

31. Heidemann C, Kuhnert R, Born S et al. (2017) 12-Month prevalence of known diabetes mellitus in Germany. Journal of Health Monitoring 2(1):43–50. https://edoc.rki.de/handle/176904/2594 (As at 09.03.2021)

32. Schmidt C, Reitzle L, Dress J et al. (2020) Pravalenz und Inzidenz des dokumentierten Diabetes mellitus – Referenzauswertung fur die Diabetes-Surveillance auf Basis von Daten aller gesetzlich Krankenversicherten. Bundesgesundheitsbl 63(1):93–102

33. Heidemann C, Scheidt-Nave C (2017) Prevalence, incidence and mortality of diabetes mellitus in adults in Germany – A review in the framework of the Diabetes Surveillance in Germany. Journal of Health Monitoring 2(3):98–121. https://edoc.rki.de/handle/176904/2819 (As at 09.03.2021)

34. National Diabetes Surveillance at the Robert Koch Institute (2019) Diabetes in Germany – National Diabetes Surveillance Report 2019. Robert Koch Institute, Berlin. https://diabsurv.rki.de/SharedDocs/downloads/DE/DiabSurv/diabetes-report_2019_eng.pdf?__blob=publicationFile&v=12#download=1 (As at 14.06.2021)

35. Baumert J, Heidemann C, Reitzle L et al. (2021) Healthy life years among people with and without diabetes in Germany. Journal of Health Monitoring 6(2):43–50. https://edoc.rki.de/handle/176904/8403 (As at 03.08.2021)

36. Holstiege J, Akmatov MK, Steffen A et al. (2020) Die ischämische Herzerkrankung in der vertragsärztlichen Versorgung – Zeitliche Trends und regionale Variationen. Versorgungsatlas-Bericht Nr 20/04. Zentralinstitut für die kassenärztliche Versorgung in Deutschland (Zi), Berlin. https://www.versorgungsatlas.de//themen/alle-analysen-nach-datum-sortiert?tab=6&uid=109&cHash=bdb4137bdc8268e1e829199cffc818e2 (As at 17.03.2021)

37. Albert MA, Glynn RJ, Buring J et al. (2006) Impact of traditional and novel risk factors on the relationship between socioeconomic status and incident cardiovascular events. Circulation 114(24):2619–2626

38. Bots SH, Peters SAE, Woodward M (2017) Sex differences in coronary heart disease and stroke mortality: a global assessment of the effect of ageing between 1980 and 2010. BMJ Glob Health 2(2):e000298

39. Busch MA, Kuhnert R (2017) 12-Month prevalence of stroke or chronic consequences of stroke in Germany. Journal of Health Monitoring 2(1):64–69. https://edoc.rki.de/handle/176904/2600 (As at 18.03.2021)

40. Busch MA, Schienkiewitz A, Nowossadeck E et al. (2013) Prävalenz des Schlaganfalls bei Erwachsenen im Alter von 40 bis 79 Jahren in Deutschland: Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1). Bundesgesundheitsbl 56(5/6):656–660

41. Steppuhn H, Kuhnert R, Scheidt-Nave C (2017) 12-month prevalence of known chronic obstructive pulmonary disease (COPD) in Germany. Journal of Health Monitoring 2(3):43–50. https://edoc.rki.de/handle/176904/2821 (As at 29.04.2021)

42. Steppuhn H, Buda S, Wienecke A et al. (2017) Time trends in incidence and mortality of respiratory diseases of high public health relevance in Germany. Journal of Health Monitoring 2(3):3–33. https://edoc.rki.de/handle/176904/2818 (As at 29.04.2021)

43. Gillissen A, Welte TH (2014) Weißbuch Lunge 2014: Herausforderungen, Zukunftsperspektiven, Forschungsansätze – Zur Lage und Zukunft der Pneumologie in Deutschland. Frisch Texte Verlag, Herne

44. Steppuhn H, Kuhnert R, Scheidt-Nave C (2017) 12-month prevalence of asthma among adults in Germany. Journal of Health Monitoring 2(3):34–42. https://edoc.rki.de/handle/176904/2820 (As at 18.03.2021)

45. Klimek L, Vogelberg C, Werfel TH (Eds) (2018) Weißbuch Allergie in Deutschland. 4., überarbeitete und erweiterte Auflage. Springer Medizin Verlag GmbH, Berlin

46. Schmitz R, Kuhnert R, Thamm M (2017) 12-Month prevalence of allergies in Germany. Journal of Health Monitoring 2(1):70–74. https://edoc.rki.de/handle/176904/2597 (As at 18.03.2021)

47. Arnold I (2016) Arthrose: Was gibt es Neues? Dtsch Arztebl International 113(44):1976–1982

48. Fuchs J, Kuhnert R, Scheidt-Nave C (2017) 12-month prevalence of osteoarthritis in Germany. Journal of Health Monitoring 2(3):51–56. https://edoc.rki.de/handle/176904/2822 (As at 29.04.2021)

49. Ferre IM, Roof MA, Anoushiravani AA et al. (2019) Understanding the Observed Sex Discrepancy in the Prevalence of Osteoarthritis. JBJS Reviews 7(9):e8

50. Schneider S, Schmitt G, Mau H et al. (2005) Prävalenz und Korrelate der Osteoarthrose in der BRD. Repräsentative Ergebnisse des ersten Bundesgesundheitssurvey. Orthopäde 34(8):782–790

51. Luong MLN, Cleveland RJ, Nyrop KA et al. (2012) Social determinants and osteoarthritis outcomes. Aging health 8(4):413–437

52. Neuhauser H, Wildner M (2020) Gains and losses in translation of SDGs at sub-national levels. Lancet 396(10256):954–955

Annex Table 1
Prevalence of subjective health rated as very good or good (n=11,953 women, n=10,681 men), chronic diseases or long-term health problems (n=11,916 women, n=10,662 men) and long-term health-related limitations in usual everyday activities (n=11,929 women, n=10,664 men) by gender, age and education level
Source: GEDA 2019/2020-EHIS

	Subjective health (very good or good)		Chronic disease or health problem (at least six months)		Health-related limitation in usual everyday activities (severe or moderate, at least six months)	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
Women (total)	**68.6**	**(67.2–69.9)**	**51.9**	**(50.6–53.3)**	**35.5**	**(34.2–36.9)**
Age group and education level						
18–29 years	87.2	(83.5–90.1)	33.8	(29.8–38.0)	16.8	(13.7–20.5)
Low education group	78.1	(67.1–86.2)	36.8	(26.8–48.0)	25.4	(16.6–36.9)
Medium education group	87.4	(82.4–91.1)	33.9	(28.7–39.6)	16.3	(12.5–21.0)
High education group	95.0	(91.4–97.1)	31.3	(24.9–38.4)	10.6	(7.0–15.5)
30–44 years	82.9	(80.1–85.3)	40.9	(37.8–44.0)	21.3	(18.7–24.2)
Low education group	74.1	(61.8–83.5)	34.4	(23.5–47.3)	25.5	(16.3–37.6)
Medium education group	81.0	(77.1–84.4)	44.7	(40.4–49.1)	23.3	(19.7–27.4)
High education group	89.6	(86.5–92.1)	37.6	(34.0–41.3)	16.4	(13.6–19.7)
45–64 years	66.0	(63.9–68.1)	58.6	(56.6–60.6)	39.2	(37.2–41.3)
Low education group	50.4	(42.8–58.0)	67.4	(59.6–74.4)	49.3	(41.6–56.9)
Medium education group	65.5	(63.0–68.0)	59.6	(57.1–62.0)	40.7	(38.3–43.3)
High education group	78.6	(76.5–80.6)	49.0	(46.6–51.5)	27.7	(25.5–29.9)
65–79 years	55.3	(52.6–57.9)	61.9	(59.4–64.5)	46.1	(43.5–48.8)
Low education group	46.1	(39.2–53.1)	62.4	(55.3–69.0)	52.4	(45.3–59.3)
Medium education group	56.4	(53.4–59.3)	61.8	(58.9–64.6)	44.5	(41.6–47.5)
High education group	67.6	(64.6–70.5)	62.1	(59.0–65.0)	40.8	(37.8–44.0)
≥80 years	42.5	(37.9–47.3)	61.9	(57.0–66.6)	63.2	(58.5–67.7)
Low education group	37.9	(29.9–46.7)	61.1	(52.2–69.4)	66.5	(57.9–74.1)
Medium education group	46.1	(40.8–51.4)	62.3	(56.8–67.4)	60.3	(54.9–65.4)
High education group	53.4	(46.5–60.0)	65.1	(58.4–71.4)	58.5	(51.6–65.0)

CI=confidence interval

Continued on next page

Annex Table 1 *Continued*
Prevalence of subjective health rated as very good or good (n=11,953 women, n=10,681 men), chronic diseases or long-term health problems (n=11,916 women, n=10,662 men) and long-term health-related limitations in usual everyday activities (n=11,929 women, n=10,664 men) by gender, age and education level
Source: GEDA 2019/2020-EHIS

	Subjective health (very good or good)		Chronic disease or health problem (at least six months)		Health-related limitation in usual everyday activities (severe or moderate, at least six months)	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
Men (total)	**71.6**	**(70.2–72.9)**	**46.4**	**(44.9–47.8)**	**31.0**	**(29.7–32.4)**
Age group and education level						
18–29 years	88.3	(85.2–90.8)	25.8	(22.6–29.2)	10.5	(8.4–13.1)
Low education group	80.9	(72.4–87.3)	31.8	(24.4–40.3)	14.8	(9.6–22.2)
Medium education group	89.8	(85.8–92.8)	23.5	(19.5–28.0)	9.8	(7.2–13.1)
High education group	94.4	(90.8–96.6)	25.0	(20.0–30.7)	7.4	(4.7–11.5)
30–44 years	84.0	(81.2–86.4)	34.6	(31.6–37.8)	18.5	(16.0–21.3)
Low education group	74.3	(61.8–83.8)	32.7	(22.0–45.5)	25.1	(15.7–37.5)
Medium education group	80.4	(76.4–83.9)	39.1	(34.6–43.8)	22.1	(18.5–26.3)
High education group	92.8	(90.6–94.5)	29.5	(26.2–33.1)	10.9	(8.7–13.6)
45–64 years	65.2	(62.8–67.5)	53.1	(50.8–55.4)	38.8	(36.5–41.3)
Low education group	47.4	(37.4–57.6)	66.8	(56.5–75.7)	61.9	(51.5–71.3)
Medium education group	60.1	(56.8–63.4)	55.8	(52.5–59.0)	42.8	(39.5–46.2)
High education group	80.4	(78.4–82.2)	43.6	(41.2–46.0)	23.6	(21.7–25.7)
65–79 years	57.7	(54.6–60.8)	63.8	(60.9–66.7)	42.9	(39.9–46.0)
Low education group	48.5	(34.3–62.9)	67.4	(52.0–79.8)	55.0	(40.3–68.9)
Medium education group	53.1	(48.7–57.5)	65.8	(61.5–69.8)	45.0	(40.7–49.4)
High education group	68.1	(65.3–70.7)	59.9	(57.1–62.6)	36.3	(33.6–39.0)
≥80 years	52.6	(47.1–58.0)	62.0	(56.6–67.1)	58.1	(52.6–63.4)
Low education group	54.5	(34.9–72.8)	67.0	(46.4–82.7)	63.7	(43.1–80.2)
Medium education group	48.0	(40.5–55.5)	62.1	(54.5–69.1)	58.8	(51.2–66.0)
High education group	58.6	(53.2–63.8)	60.4	(55.0–65.6)	54.2	(48.9–59.5)

CI=confidence interval

Annex Table 2
Prevalence of depressive symptoms in the past two weeks based on PHQ-8 by gender, age and education level (n=11,703 women, n=10,503 men)
Source: GEDA 2019/2020-EHIS

	%	(95% CI)
Women (total)	**8.8**	**(8.0–9.7)**
Age group and education level		
18–29 years	11.6	(8.8–15.1)
Low education group	24.0	(15.2–35.6)
Medium education group	10.3	(7.1–14.6)
High education group	4.4	(2.2–8.5)
30–44 years	8.7	(6.8–10.9)
Low education group	13.6	(7.1–24.4)
Medium education group	9.4	(6.9–12.7)
High education group	5.4	(3.7–8.0)
45–64 years	10.2	(8.8–11.7)
Low education group	18.0	(12.8–24.7)
Medium education group	9.5	(7.9–11.3)
High education group	6.6	(5.4–8.1)
65–79 years	5.0	(3.9–6.3)
Low education group	6.0	(3.4–10.5)
Medium education group	4.5	(3.4–5.9)
High education group	5.3	(3.9–7.1)
≥80 years	7.3	(4.9–10.7)
Low education group	7.9	(3.9–15.4)
Medium education group	7.1	(4.8–10.4)
High education group	5.9	(3.4–10.1)

	%	(95% CI)
Men (total)	**7.5**	**(6.7–8.5)**
Age group and education level		
18–29 years	7.3	(5.3–10.0)
Low education group	12.5	(7.4–20.4)
Medium education group	6.6	(4.2–10.1)
High education group	3.0	(1.6–5.3)
30–44 years	7.3	(5.5–9.5)
Low education group	11.9[1]	(5.6–23.4)
Medium education group	9.2	(6.6–12.6)
High education group	2.9	(1.9–4.5)
45–64 years	9.6	(8.0–11.5)
Low education group	18.6	(11.5–28.6)
Medium education group	11.3	(9.0–14.1)
High education group	3.6	(2.7–4.6)
65–79 years	4.4	(3.1–6.3)
Low education group	11.9[1]	(4.4–28.3)
Medium education group	3.9	(2.6–5.8)
High education group	2.7	(1.9–3.8)
≥80 years	5.8	(3.8–8.7)
Low education group	5.0[1]	(0.9–24.3)
Medium education group	5.5	(3.0–9.7)
High education group	7.0	(4.5–10.8)

CI=confidence interval, PHQ-8=8-item Patient Health Questionnaire
[1] Number of cases is n<10

Imprint

Journal of Health Monitoring

Publisher
Robert Koch Institute
Nordufer 20
13353 Berlin, Germany

Editors
Johanna Gutsche, Dr Birte Hintzpeter, Dr Franziska Prütz,
Dr Martina Rabenberg, Dr Alexander Rommel, Dr Livia Ryl,
Dr Anke-Christine Saß, Stefanie Seeling, Dr Thomas Ziese
Robert Koch Institute
Department of Epidemiology and Health Monitoring
Unit: Health Reporting
General-Pape-Str. 62–66
12101 Berlin, Germany
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Kerstin Möllerke, Alexander Krönke

Translation
Simon Phillips/Tim Jack

ISSN 2511-2708

Note
External contributions do not necessarily reflect the opinions of the Robert Koch Institute.

The Robert Koch Institute is a Federal Institute within the portfolio of the German Federal Ministry of Health

Journal of Health Monitoring · 2021 6(3)
DOI 10.25646/8553.2
Robert Koch Institute, Berlin

Almut Richter, Anja Schienkiewitz, Anne Starker, Susanne Krug, Olga Domanska, Ronny Kuhnert, Julika Loss, Gert B. M. Mensink

Robert Koch Institute, Berlin
Department of Epidemiology and Health Monitoring

Submitted: 18.03.2021
Accepted: 16.06.2021
Published: 15.09.2021

Health-promoting behaviour among adults in Germany – Results from GEDA 2019/2020-EHIS

Abstract

Health-promoting behaviours are important at any age to prevent diseases and to promote well-being. Using data from GEDA 2019/2020-EHIS, a Germany-wide, representative survey, this article describes how often the adult population in Germany reports certain types of health-promoting behaviour in their everyday lives. The behaviours considered are non-smoking, low-risk alcohol consumption, achievement of the World Health Organization's (WHO) recommendations on aerobic physical activity, at least daily fruit and vegetable consumption, and maintaining a body weight within the normal range. This article describes the proportion of people who report these behaviours in their everyday lives by gender, age and education level, the number of health-promoting behaviours each person reports and the most common combinations in which they occur.

Young adults between 18 and 29 years are most likely to achieve a health-promoting lifestyle. The proportion of people who report at least 150 minutes of physical activity per week and a normal body weight is lower in later adulthood than among 18- to 29-year-olds. The recommendation to eat fruit and vegetables daily is implemented least often of all five aspects of health behaviour under study. Finally, women are more likely to lead a health-promoting lifestyle than men.

HEALTH-RELATED BEHAVIOUR · COMBINATIONS OF BEHAVIOUR · HEALTH-PROMOTING LIFESTYLE · ADULTS

1. Introduction

Certain types of behaviour can help people maintain or improve their health. The COVID-19 pandemic demonstrated this with regard to infections: social distancing, appropriate implementation of hygiene rules on coughing and sneezing, as well as masks that cover mouth and nose have all been crucial in mitigating the spread of SARS-CoV-2. Just as there are measures that influence communicable diseases, certain forms of health-related behaviour play a significant role in the development or prevention of chronic diseases. An estimation for 2017 suggests that 11.6 million years of life were lost in Germany due to premature mortality [1]. Premature mortality refers to people dying at any age lower than their statistical life expectancy. Malignant neoplasms (35.2%) and cardiovascular diseases (27.6%) are the main causes of premature mortality in Germany [1]. Not smoking, low-risk alcohol consumption, regular physical activity, a healthy, plant-based diet and maintaining a body weight within the normal range can lower the risk of falling ill or dying prematurely from these conditions [2]. In particular, the interaction of several

This article has been corrected as of March 30, 2022 (see erratum, page 44)

GEDA 2019/2020-EHIS

Fifth follow-up survey of the German Health Update

Data holder: Robert Koch Institute

Objectives: Provision of reliable information on the health status, health behaviour and health care of the population living in Germany, with the possibility of European comparisons

Study design: Cross-sectional telephone survey

Population: German-speaking population aged 15 and older living in private households that can be reached via landline or mobile phone

Sampling: Random sample of landline and mobile telephone numbers (dual-frame method) from the ADM sampling system (Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V.)

Sample size: 23,001 respondents

Study period: April 2019 to September 2020

GEDA survey waves:
- GEDA 2009
- GEDA 2010
- GEDA 2012
- GEDA 2014/2015-EHIS
- GEDA 2019/2020-EHIS

Further information in German is available at www.geda-studie.de

behaviours as part of an overall health-promoting lifestyle is associated with the greatest reduction in the risk of certain causes of death and overall mortality [3–8]. A meta-analysis with a mean observation period of 13.2 years found a combination of at least four health-promoting behaviours to be associated with a 66% reduction in all-cause mortality [7]. A study in the United States showed that women who reported five health-promoting behaviours could extend their lifespan after the age of 50 by 14.0 years and men could do so by 12.2 years compared with people who reported none of them [9].

According to a study based on data from the 2014 European Social Survey, only 5.8% of adults in Europe combine several forms of health-promoting behaviour, such as physical activity, not smoking, avoiding excessive levels of alcohol, eating fruit and vegetables every day and ensuring adequate sleep [10]. Similarly, the German Health Update (GEDA) 2009/2010 found that just 7.1% of women and 3.2% of men combined five forms of healthy behaviour. On the other hand, 29.1% of women and 17.8% of men reported to combine at least four out of five health-related behaviours [11].

Health-promoting lifestyles are determined not only by individual characteristics, but also by various social and economic as well as contextual factors. Moreover, different factors become effective at different ages, for example when social or family environment or time and financial resources change [12].

GEDA 2019/2020-EHIS provides current population-wide data that allow for a differentiated description of various health-related behaviours in Germany. The aim of this analysis is to determine the frequency of non-smoking, low-risk alcohol consumption, aerobic physical activity, daily consumption of fruit and vegetables, and normal-range body weight in Germany, and to identify any differences by gender, age and level of education. The health-related behaviours under study are considered individually and in different combinations.

2. Methodology

2.1 Study design and sample

GEDA is a nationwide cross-sectional survey of the German-speaking resident population in Germany. The GEDA study has been conducted by the Robert Koch Institute (RKI) on behalf of the German Federal Ministry of Health at multi-year intervals since 2008 and is part of the health monitoring at the RKI [13, 14]. The GEDA study analyses various topics such as health status, health behaviour, chronic diseases and the utilisation of health care services.

The fifth follow-up survey, GEDA 2019/2020-EHIS, took place between April 2019 and September 2020. As in the 2014/2015 wave, the questionnaire of the European Health Interview Survey (EHIS) was fully integrated [15, 16]. GEDA 2019/2020-EHIS was conducted as a telephone interview survey using a computer assisted, fully structured interview (i.e. Computer Assisted Telephone Interview, CATI). It was based on a random sample of landline and mobile telephone numbers (dual-frame method) [17]. The sample comprised the population aged 15 years and older living in private households and with permanent residency in Germany. A total of 23,001 people provided complete interviews for the GEDA 2019/2020-EHIS study. For the analyses set out here, these respondents were narrowed down to 22,708

people aged 18 or above. GEDA 2019/2020-EHIS used gender identities to describe gender differences and allowed the respondents to indicate which gender they felt they belonged to. Respondents 18 years and older included 11,959 women and 10,687 men. 62 respondents provided a different gender identity to the one that they were assigned at birth or gave no information at all. These individuals are not included in the gender stratified analyses.

Based on the standards of the American Association for Public Opinion Research (AAPOR), the response rate was 21.6% (RR3) [18].

A detailed description of the methodology applied for GEDA 2019/2020-EHIS can be found in Allen et al. in this issue of the Journal of Health Monitoring [19].

2.2 Indicators

Each of the health-promoting behaviours considered here is represented by a specific indicator.

Low-risk alcohol consumption

In GEDA 2019/2020-EHIS, the AUDIT-C (Alcohol Use Disorder Identification Test – Consumption Questions) was used to record the frequency and volume of alcohol consumption [20]. The participants were first asked about the frequency of their alcohol consumption in the last twelve months. Respondents who stated that they drank alcohol at least once a week were then asked about the number of standard drinks they consumed on weekdays (Monday to Thursday) and weekends (Friday to Sunday). This information was used to calculate the respondents' mean consumption of pure alcohol per day in grams. In line with evidence-based guidelines [21, 22], ≤ 10 grams of pure alcohol per day for women and ≤ 20 grams per day for men was defined as low-risk level alcohol consumption. The indicator is considered fulfilled for those who stated that they had not drunk alcohol in the past twelve months, had done so less than once a month, or between once a month and two to three days per month and furthermore for people who reported that they had drunk alcohol at least once a week without exceeding the limits described above.

Current non-smoking

Data on smoking status was collected using the question: 'Do you smoke tobacco products, including heated tobacco products?' (Answer categories: 'yes, daily', 'yes, occasionally', 'no, not any more', 'I have never smoked'). The answers were used to distinguish between current smoking ('yes, daily' or 'yes, occasionally') and current non-smoking ('no, not any more' or 'I have never smoked'). This article refers to the indicator 'current non-smoking'.

Aerobic physical activity

The physical activity indicator was defined in line with the minimum recommendations for aerobic physical activity drawn up by the World Health Organization (WHO) [23, 24]. Data was gathered for the indicator using the German validated version of the European Health Interview Survey – Physical Activity Questionnaire (EHIS-PAQ) [25]. The participants were asked about their work-related, transport-related and leisure-time physical activity in a typical week. The indicator considers data on the weekly duration of at least moderate-intensity aerobic physical activity conducted during leisure time and the amount of

time spent cycling used for transportation [25]. Data on walking was not included. Respondents undertaking aerobic physical activity for at least 150 minutes per week are considered to have fulfilled the conditions for the indicator.

Normal weight

Data on height and weight were reported by the respondents. Data on height was collected by asking: 'How tall are you if you are not wearing shoes?'. The information was provided in centimetres. Data on body weight was collected with the question: 'How much do you weigh if you are not wearing clothes and shoes? Please enter your weight in kg. Pregnant women should provide their weight before pregnancy'. Body mass index (BMI) is calculated using the ratio of body weight to height squared (kg/m²). The WHO classifies a weight within the normal range as a BMI between 18.5 kg/m² and 25 kg/m² [26].

Daily fruit and vegetable consumption

The indicator 'at least daily fruit and vegetable consumption' was created to assess the consumption of fruit and vegetables. Data for the indicator was collected using the following questions: 'How often do you eat fruit? Please include dried, frozen and canned fruit, but not fruit juices'. 'How often do you eat vegetables and salads? Please include dried, frozen and canned vegetables, but not potatoes or vegetable juices'. Five response options were given in each case ranged from 'daily or several times a day' to 'never'. Respondents who stated that they ate fruit and vegetables at least daily were categorised as 'yes' and fulfilled the conditions of the indicator. If one of the items was missing, the indicator variable was coded as missing.

A health-promoting lifestyle includes behaviours such as not smoking, low-risk alcohol consumption, daily fruit and vegetable consumption, regular physical activity following international recommendations, and maintenance of a body weight within the normal range.

Health-promoting lifestyle

The five indicators were used to assign an overall score to respondents' health-promoting lifestyle. One point was awarded for each of the five behaviours reported if the corresponding indicator is realised. Lifestyles with a higher score can be viewed as healthier. In addition, a dichotomous variable is created using the total score (threshold value ≥4) to indicate that at least four of the five indicators were realised.

Sociodemography

The results are depicted by gender, age and education. The International Standard Classification for Education (ISCED) is used to classify the information provided by respondents on education [27]. The ISCED system takes into account both school and vocational qualifications and is particularly useful for international comparisons. ISCED categories 0 to 2 were grouped into a low, 3 to 4 into a medium, and 5 to 8 into a high education group.

2.3 Statistical analyses

The analyses are based on data from 11,959 women and 10,687 men aged between 18 and 99 years. For each indicator, respondents without information for the variables on which the indicator is based were excluded from the analyses. This led to the exclusion of 292 individuals for normal weight, 31 for fruit and vegetable consumption, 262 for aerobic physical activity, 314 for alcohol consumption and 9 for smoking. For the overall scores, respondents were excluded if they provided no data on one or more indicators (840 participants). Any categories representing less than 2% of

respondents were aggregated with the next category, in order to mitigate the effect of the low number of cases and the lack of accuracy associated with such figures. The combinations of health-related behaviour are determined, and the most frequent combinations are presented.

The results for women and men are presented separately by age (18–29 years, 30–44 years, 45–64 years and ≥65 years) and education level (ISCED classification: low, medium, high education group). In order to test the independent influence on health-related behaviour of gender, age and education level, a logistic regression model was used that included these factors as influencing variables. The dichotomous variable mentioned above, which indicates whether the conditions for at least four of the five indicators were realised, was the outcome variable.

The analyses were carried out using a weighting factor to correct the sample for deviations from the population structure. For data weighting, design weighting was first applied to account for the different selection probabilities (of mobile and landline numbers). Subsequently, an adjustment based on the official population figures was carried out with regard to age, sex, federal state and district type (as of 31 December 2019). In addition, weighting also accounted for the distribution of education levels in the 2017 microcensus according to the ISCED classification [27].

The analyses were carried out using the procedures available in SAS 9.4. In order to take the weighting appropriately into account, confidence intervals (CI) and p-values were calculated using SAS survey procedures. A statistically significant difference between groups is assumed if the corresponding p-value in the Rao-Scott chi-square independence test is lower than 0.05.

Significantly more women than men practice at least four out of five health-promoting behaviours (35.6% of women and 22.1% of men).

3. Results

The following describes the percentage of the population that reported a health-related behaviour in their everyday life. The results are set out by women and men, age and education level (Table 1).

Low risk alcohol consumption

The vast majority of both women and men either do not drink alcohol, drink it rarely, or drink less than the respective amounts considered risky (Table 1). The highest percentage of low-risk alcohol consumption was found among women aged between 30 and 44, at 91.4% (Figure 1 and Figure 2). A larger proportion of women in the low education group reported low-risk alcohol consumption compared with women in the medium or high education group. This difference also exists between men, but is only statistically significant between the low and high education group.

Current non-smoking

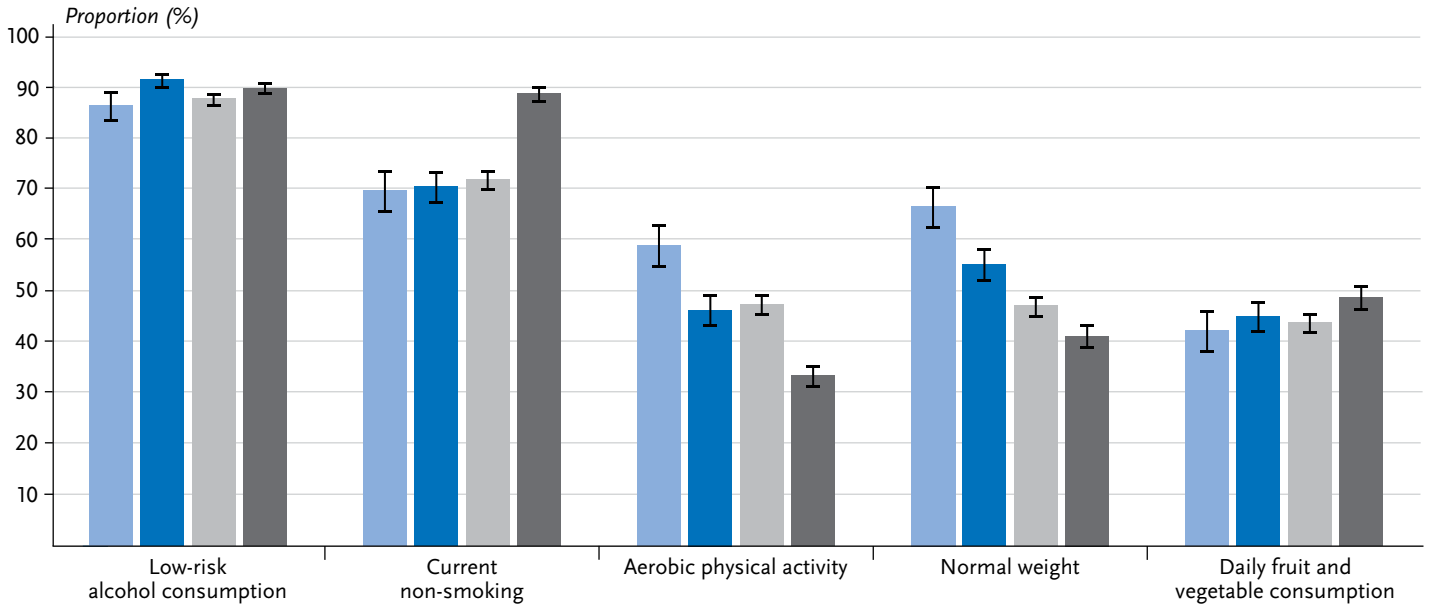
76.0% of women and 66.1% of men do not currently smoke. The proportion of current non-smokers remains relatively stable up to the age of 65. However, it is significantly higher at retirement age than among younger aged groups. In addition, a positive association was identified between level of education and non-smoking; this trend is particularly pronounced among men. Slightly more than half of men in the low education group are current non-smokers, whereas almost 80% of men in the high education group do not currently smoke.

Table 1
Health-related behaviour by gender, age and education level (n=11,959 women, n=10,687 men)
Source: GEDA 2019/2020-EHIS

	Low-risk alcohol consumption[1]		Current non-smoking		Aerobic physical activity[2]		Normal weight[3]		Daily fruit and vegetable consumption	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Total										
Women	88.9	(88.1–89.7)	76.0	(74.7–77.3)	44.8	(43.5–46.1)	50.0	(48.6–51.4)	45.1	(43.8–46.5)
Men	83.9	(82.8–85.0)	66.1	(64.6–67.5)	51.2	(49.8–52.7)	38.3	(36.9–39.7)	24.1	(22.9–25.3)
p-value[4]		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Age group										
Women										
18–29 years	86.4	(83.2–89.1)	69.6	(65.4–73.6)	58.9	(54.6–63.0)	66.6	(62.4–70.6)	42.1	(38.0–46.3)
30–44 years	91.4	(89.8–92.8)	70.4	(67.2–73.4)	46.2	(43.1–49.4)	55.1	(51.9–58.3)	44.9	(41.8–48.0)
45–64 years	87.6	(86.3–88.8)	71.8	(69.7–73.7)	47.3	(45.3–49.3)	47.0	(44.9–49.0)	43.7	(41.7–45.7)
≥65 years	89.8	(88.5–91.0)	88.7	(87.1–90.2)	33.3	(31.2–35.4)	41.1	(38.8–43.5)	48.7	(46.3–51.1)
p-value[4]		0.0006		<0.0001		<0.0001		<0.0001		0.0108
Men										
18–29 years	85.2	(82.2–87.8)	59.5	(55.7–63.3)	69.3	(65.6–72.7)	60.7	(56.9–64.4)	22.7	(19.8–25.8)
30–44 years	86.4	(83.9–88.5)	55.0	(51.6–58.3)	53.5	(50.2–56.8)	40.4	(37.2–43.6)	23.4	(20.8–26.1)
45–64 years	82.4	(80.5–84.2)	63.3	(60.9–65.6)	46.4	(44.1–48.7)	30.4	(28.3–32.5)	22.0	(20.2–24.0)
≥65 years	82.7	(80.6–84.7)	86.4	(84.2–88.3)	42.6	(40.0–45.2)	31.4	(29.0–33.9)	28.9	(26.7–31.3)
p-value[4]		0.0350		<0.0001		<0.0001		<0.0001		0.0002
Education level										
Women										
Low education group	92.9	(90.7–94.7)	72.4	(68.6–76.0)	27.4	(24.0–31.0)	42.7	(38.7–46.8)	42.3	(38.4–46.3)
Medium education group	89.1	(88.0–90.1)	74.7	(73.1–76.2)	46.7	(45.0–48.4)	48.8	(47.1–50.5)	42.9	(41.2–44.6)
High education group	84.1	(82.6–85.4)	83.3	(81.7–84.7)	56.6	(54.7–58.4)	60.4	(58.5–62.1)	54.6	(52.7–56.4)
p-value[4]		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001
Men										
Low education group	88.3	(84.2–91.4)	54.9	(49.5–60.2)	46.0	(40.7–51.4)	35.5	(30.7–40.7)	23.1	(19.0–27.8)
Medium education group	83.7	(82.0–85.2)	62.5	(60.4–64.5)	49.3	(47.3–51.4)	37.6	(35.6–39.6)	21.2	(19.6–22.8)
High education group	82.2	(80.9–83.4)	78.0	(76.6–79.4)	57.3	(55.7–58.8)	40.8	(39.2–42.4)	29.9	(28.5–31.3)
p-value[4]		0.0108		<0.0001		<0.0001		0.0715		<0.0001

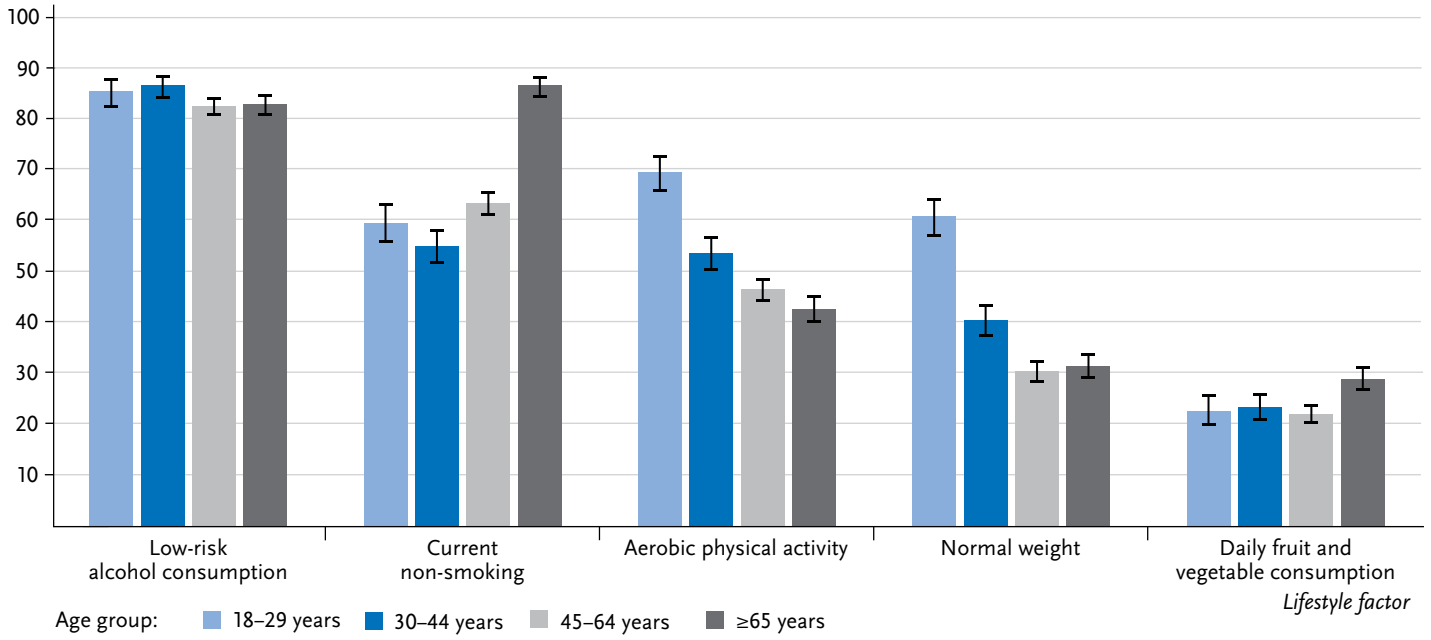
CI=confidence interval
[1] Mean consumption of ≤10 grams of pure alcohol per day for women and ≤20 grams per day for men
[2] Achievement of the World Health Organization's (WHO) recommendations on aerobic physical activity (at least 150 minutes per week)
[3] In line with the standards used by the WHO, a body mass index ranging from 18.5kg/m² to 25kg/m²
[4] Rao-Scott chi-square independence test

Figure 1
Percentage of women who realised the criteria for the particular indicators by age (n=11,959)
Source: GEDA 2019/2020-EHIS



Most adults in Germany report implementing two or three out of five health-promoting behaviours (56.2% of women and 62.5% of men).

Figure 2
Percentage of men who realised the criteria for the particular indicators by age (n=10,687)
Source: GEDA 2019/2020-EHIS



Young adults are more likely to achieve a health-promoting lifestyle than people in the older age groups.

Aerobic physical activity

Overall, 44.8% of women and 51.2% of men meet the WHO recommendations on aerobic physical activity. The percentage decreases in both women and men with age, and is highest among 18- to 29-year-olds and lowest among people aged 65 or above. There is one exception: women between the ages of 45 and 64 meet the WHO's recommendations on aerobic physical activity almost as often as women aged between 30 and 44. Women and men in the high education group achieve the recommendations more frequently than those in the medium and lower education group. In contrast to men, women in the medium education group also achieve the WHO's recommendations on aerobic physical activity more often than those in the lower education group. The differences by education are more pronounced among women than among men.

Normal weight

Overall, 50.0% of women and 38.3% of men have a normal BMI. The percentage of women and men with a normal-range weight steadily decreases with age: whereas 66.6% of women and 60.7% of men aged 18 to 29 have a normal weight, the percentage falls to 41.1% among women and 31.4% among men aged 65 or above. In addition, women in the high education group are significantly more likely to have a normal weight than women in the low education group.

Daily fruit and vegetable consumption

Almost twice as many women (45.1%) as men (24.1%) reported that they ate fruit and vegetables every day. The proportion of people who do so remains relatively constant across age groups from young adulthood to the end of working life. After retirement, a few more women and men manage to integrate fruit and vegetables into their daily diets. Nevertheless, women continue to eat fruit and vegetables significantly more often every day compared with men. More people in the high education group eat fruit and vegetables every day compared with those in the medium or low education group. Women in the high education group fulfil the conditions for this indicator particularly often.

Health-promoting lifestyle

Most adults in Germany practice two or three health-promoting behaviours (56.2% of women and 62.5% of men). More women than men report four or five health-related behaviours at the same time (Figure 3, Figure 4 and Annex Table 1). Only one or none of these health-related behaviours is realised by 8.3% of women and 15.3%. Because only 1% to 2% of respondents reported none of

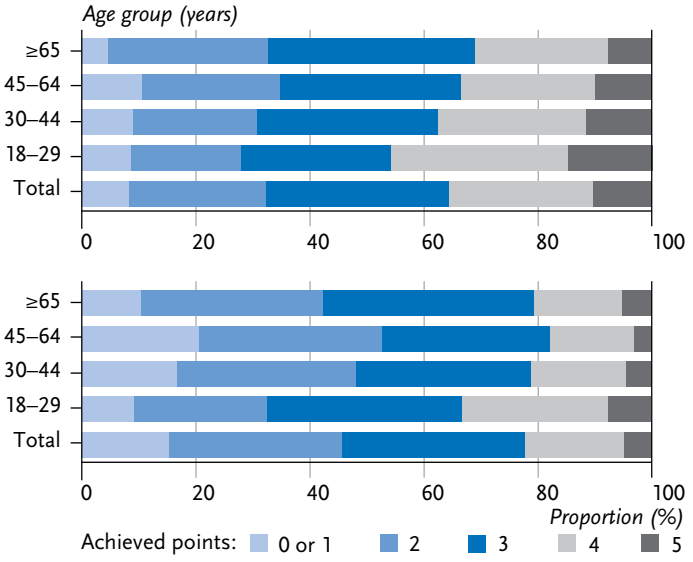


Figure 3 (above)
Achieved points of women in health-promoting lifestyle by age (n=11,469)
Source: GEDA 2019/2020-EHIS

Figure 4 (below)
Achieved points of men in health-promoting lifestyle by age (n=10,337)
Source: GEDA 2019/2020-EHIS

the health-promoting behaviours under study, data on this category has been aggregated with the adjacent category.

In young adulthood, 45.8% of women and 33.4% of men report four or five health-related behaviours. This proportion reduces with age. The fact that every fifth men aged between 45 and 64 reported one or less achieved health-promoting behaviour is particularly striking; among women, it is only one in ten in this age group. On the other hand, in the group of 65-year-olds and older, the proportion of women and men with no more than one health-promoting behaviour is only about half that of the previous age group.

The results of the multivariate analyses show whether gender, age and education level are independently associated with health-promoting lifestyle. Women (OR=2.2; 95% CI 2.0–2.4) and people in the high (OR=2.8; 95% CI 2.4–3.4) or medium (OR=1.5; 95% CI 1.3–1.8) education group more frequently report at least four health-related behaviours. This also applies to people aged 18 to 29 (OR=2.0; 95% CI 1.7–2.3) compared with people aged 65 or above.

Women and men in the higher education group are more likely to achieve a health-promoting lifestyle than people in the medium and low education group.

Most frequent combinations of health-related behaviours

In addition to the scores calculated for people's health-promoting lifestyle, the combination of individual behaviours is also interesting. The most common combination identified among women is non-smoking together with low-risk alcohol consumption (Table 2). This is followed by a combination

Number assigned to the combination	Low-risk alcohol consumption[1]	Current non-smoking	Aerobic physical activity[2]	Normal weight[3]	Daily fruit and vegetable consumption	%
Women						
1	+	+	–	–	–	12.4
2	+	+	+	+	+	10.5
3	+	+	–	–	+	9.4
4	+	+	–	+	–	8.1
5	+	+	+	+	–	7.9
6	+	+	+	–	+	6.9
7	+	+	–	+	+	6.8
8	+	+	+	–	–	6.3
9	+	–	–	–	–	4.7
10	+	–	–	+	–	4.2
11	+	–	+	+	–	2.5
12	+	–	–	–	+	2.0
13	+	–	+	–	–	2.0
14	+	–	+	+	+	1.9
15	+	–	–	+	+	1.7

+ health-promoting behaviour was reported, - health-promoting behaviour was not reported
[1] Mean consumption of ≤10 grams of pure alcohol per day for women and ≤20 grams per day for men
[2] Achievement of the World Health Organization's (WHO) recommendations on aerobic physical activity (at least 150 minutes per week)
[3] In line with the standards used by the WHO, a body mass index ranging from 18.5kg/m² to 25kg/m²

Table 2
Proportions of the 15 most common combinations of health-related behaviours by gender (n=11,469 women, n=10,337 men)
Source: GEDA 2019/2020-EHIS

Continued on next page

Table 2 *Continued*
Proportions of the 15 most common combinations of health-related behaviours by gender (n=11,469 women, n=10,337 men)
Source: GEDA 2019/2020-EHIS

Number assigned to the combination	Low-risk alcohol consumption[1]	Current non-smoking	Aerobic physical activity[2]	Normal weight[3]	Daily fruit and vegetable consumption	%
Men						
1	+	+	–	–	–	13.9
2	+	+	+	–	–	13.5
3	+	+	+	+	–	8.7
4	+	–	–	–	–	7.4
5	+	+	–	+	–	5.6
6	+	+	+	–	+	5.1
7	+	–	+	+	–	4.7
8	+	+	+	+	+	4.7
9	+	–	+	–	–	4.6
10	+	+	–	–	+	4.4
11	+	–	–	+	–	4.4
12	–	+	–	–	–	2.2
13	–	+	+	–	–	2.1
14	–	–	–	–	–	2.0
15	+	+	–	+	+	1.9

+ health-promoting behaviour was reported, - health-promoting behaviour was not reported
[1] Mean consumption of ≤10 grams of pure alcohol per day for women and ≤20 grams per day for men
[2] Achievement of the World Health Organization's (WHO) recommendations on aerobic physical activity (at least 150 minutes per week)
[3] In line with the standards used by the WHO, a body mass index ranging from 18.5kg/m² to 25kg/m²

of all five indicators, and then the combination of non-smoking, low-risk drinking and daily fruit and vegetable indicators.

Similarly, the most common combination among men is non-smoking and low-risk alcohol consumption; however, this is followed by 13.5% of men who also achieve the WHO's recommendations on aerobic physical activity during their everyday lives. A combination of all indicators, with the exception of daily fruit and vegetable consumption, is clearly less frequently.

4. Discussion

For a healthy lifestyle, it is recommended to eat a mostly plant-based and varied diet, to be physically active on a regular basis, to monitor one's body weight, to drink alcohol in moderation and avoid smoking. Only a small proportion of the population fulfils all five of these health-promoting behaviours, with most adults in Germany achieving just two or three. A health-promoting lifestyle with four or five realised behaviours is most common among young adults aged between 18 and 29 years. Women are more likely to achieve a health-promoting lifestyle than men; people in the high education group are more

likely to do so than those in the medium and lower education group.

In later adulthood the proportions of those who are physically active for at least 150 minutes per week or have a normal-range body weight are lower. The recommendation to eat fruit and vegetables daily is realised least often out of the five indicators under study. Men achieve the WHO recommendation on aerobic physical activity more often than women.

Few studies that use data from a population-based sample describe health-related behaviour in a similar way. These studies also vary in the number and type of behaviour parameters that they analyse and the criteria that they use to do so. However, similar to the present results, it can be seen consistently that only a minor proportion of the adult population fulfils the conditions for all of the indicators that were studied; this not only applies in the case of an earlier study in Germany [11] but also across Europe [10] and even worldwide [28–31].

More women than men adopt a lifestyle that is in line with the recommendations on health-related behaviour [11, 29–33], but other surveys have also found that men fulfil the recommendations for physical activity more often compared with women [11, 31]. Other studies have also identified better health-related behaviour among higher educated groups [29–31, 34]. The association between age and health-related behaviour is less clear, depending on study and country, different age groups had a better health-related behaviour [10, 29, 31, 35].

A meta-analysis examined whether certain clusters of health-promoting behaviours occur more frequently together, and whether their prevalence differs between subgroups [36]. The most common cluster identified by the analyses set out here was that of non-smoking combined with low-risk alcohol consumption; this applies to both women and men. The same combination has been identified by other studies [36]. The analyses set out here only rarely found a combination of a healthy diet – assessed as daily fruit and vegetable consumption – and regular physical activity, despite the fact that addressing both factors is recommended to prevent overweight [37, 38]. However, in the present study, dietary behaviour is represented in a simplified way which may explain the lower correlation identified here with physical activity and BMI.

Both the number of reported health-related behaviours and the way in which they are combined are important for disease prevention [6, 39, 40]. In particular, combinations that include smoking are associated with an increased risk of all-cause mortality and mortality from cardiovascular diseases [6]. In contrast, people that combine a normal weight and at least two of the factors non-smoking, moderate alcohol consumption and physical activity were found to have a particularly high number of years of life free from non-communicable diseases (such as diabetes mellitus and cardiovascular diseases) [39].

GEDA 2019/2020-EHIS is based on a large sample which allows representative statements for population health in Germany [19]. GEDA was conducted with a high degree of standardisation. One limitation of the study, however, is its survey mode. The use of self-reported data instead of measurements can influence results, for example of body height and weight, as people tend to underestimate their weight and overestimate their height [41]. The analyses undertaken here only examined a selection of

behaviours that are considered to promote health. The available data made it impossible to consider factors such as sleep behaviour or how a person deals with stress. In line with previous studies, maintaining a normal weight was regarded as an independent health-promoting behaviour [7–9, 11, 29–31]. However, it can also be viewed as resulting from the interplay of diet and exercise. Ultimately, there is no standard established definition of a healthy lifestyle, and different operationalisations are used in different studies [10, 11, 28–30].

This study describes a health-promoting lifestyle in terms of a simple overall score. This values each health-related behaviour equally, even though the preventive importance of a particular behaviour can be different and vary depending on the target variable (risk associated with certain diseases, disease-specific mortality or all-cause mortality). With a score of two it cannot be assumed that people generally live a healthy lifestyle (they fail to fulfil the conditions of three other indicators). For a lifestyle with at least four health-relevant behaviours many studies have shown health benefits [7].

The indicators used are based on the questionnaire of the European Health Interview Survey (EHIS) [15, 16]. The reference periods differ depending on the indicator (e.g. 'in the last year' for alcohol consumption or 'current' for smoking). This article assessed health-related behaviour using recommendations and threshold values. However, the selected threshold values oversimplify the respective behaviour. For example, if both aspects of the WHO's recommendations on physical activity, i.e. aerobic physical activity and muscle strengthening (on at least two days per week) [23, 24], were used, only 23.1% of women and 29.0% of men would fulfil the conditions for this indicator. At the same time, the selected threshold values do not allow to differentiate in more detail: for example, respondents who do not consume fruit on a daily basis do not meet the conditions for this indicator, although they may eat a large amount of vegetables. This demonstrates that improvements to individual health-related behaviour that are below the selected threshold values are also desirable and can come with health benefits. It has also been argued that people should completely avoid alcohol in order to reduce overall mortality [42]. In addition, the behaviours considered here could be assessed in a more differentiated manner, for example nutrition could have been analysed by focusing on other types of food. However, not enough data were available to do so.

Further information on the GEDA study is described in detail elsewhere [19]. Part of the data collection by GEDA 2019/2020-EHIS was conducted at the beginning of the COVID-19 pandemic. From mid-March 2020, extensive containment measures and policies came into effect, such as contact restrictions, and the closure of schools, shops, restaurants, and many public facilities. Initial evaluations of the possible impact of these measures on health behaviour have identified a higher body weight and a higher BMI among the population compared with the same period in 2019. In contrast, the number of tobacco smokers has decreased [43]. The COVID-19 pandemic containment measures, therefore, appear to have resulted in changes in individual behaviour. However, the impact that these measures will have on health at the individual and population level remains to be seen [44].

The results demonstrate that health-related behaviours can differ significantly by age and gender. This underscores the need for preventive and health-promoting measures that take into account people's heterogeneous needs, requirements and circumstances. Men, for example, consume less often fruit and vegetables on at least a daily basis; whereas women are less likely to follow the recommendations on physical activity than men. This provides a starting point for measures that take these gender-based differences into account. However, such measures can only be effective if they also account for the specific causes and barriers to health-promoting or risky behaviour that apply in each case. These include issues such as gender roles and social constructs of femininity and masculinity [45]. This not only applies when addressing these issues [46, 47], but also for context-related interventions and structural changes that may result in different possibilities for women and men. So far there has been little research on gender-sensitive approaches to preventive measures, especially with regard to how these measures can contribute towards breaking down gender stereotypes instead of consolidating them (gender-transformative prevention) [48, 49].

Differences in health behaviour have also been identified by age. The proportion of non-smokers increases with age and is highest among people aged 65 or above. In contrast, achievement of the WHO's recommendations on aerobic physical activity decreases with age. There are many possible explanations for these differences. For example, the decline in physical fitness and the increase in frailty, especially among over 65-year-olds, could explain the age-related differences in physical activity. In addition to biological aspects, however, social aspects can also play a role. There are signs that certain biographical events and changes in people's lives can have an impact on health-related behaviour and BMI, for example, retirement and changes in family status (starting a family, divorce, losing a partner, children leaving the family home) [50–53]. The particularly favourable health-related behaviour identified among people aged 65 or above (e.g. not smoking) could also be influenced by selection effects, as the proportion of people with high-risk behaviour may be lower in older age groups due their possibly shorter life expectancy.

However, in general, neither age nor gender alone can explain the difference in the prevalence of health-relevant behaviour. Socioeconomic factors also play an important role. Across all age groups and among all of the behaviours considered, favourable health-related behaviour is found significantly more often among people with a higher level of education compared with people with a lower level of education. This association has already been described in the literature [34] and underscores the need for preventive and health-promoting measures to be planned in a manner that particularly provides health-related options for people with a low level of education. Low-risk alcohol consumption is an exception: women in the low education group are more likely to demonstrate low-risk alcohol consumption than women in the high education group. This is confirmed by other national and international studies [54, 55]. One of the explanations discussed in the literature is that different role models exist: women with a higher education level tend to face greater professional demands and earn a higher income, aspects that are linked to traditional 'male' roles, which is then further reflected in their risky alcohol consumption [56]. However, these find-

ings can also be explained against the background of changing cultural and social norms, such as to women's position in society [57]. More research is needed into consumption patterns, alcohol products that women consume and how and when they are drinking alcohol. Furthermore, this research would need to be conducted against the background of gender-based differences and differences in social circumstances. Finally, more research is needed into how measures can contribute towards achieving health equity.

Differences between population groups arise not only at the level of individual health-related behaviour, but also at the lifestyle level (when considered as the overall score of the five selected health behaviours). The results show that the highest percentage of people who combine four or five of the behaviours under study can be found in the youngest study group – people aged 18 to 29. However, this still only applies to 33.0% of men in this age group; and it does apply to significantly more women, at 45.3%. The overall score provides a useful means of assessing the preventive relevance of a particular lifestyle. The more beneficial behaviours are combined, the more likely it is to have a decreased risk of morbidity from various chronic diseases [8].

Instead of fostering health-promoting behaviour, the given societal framework and context factors often hinder health-promoting behaviour. As long as healthy choices are not the easiest ones to make [58], people will find it difficult to regularly fulfil the requirements for all health-promoting indicators in their everyday lives. Appropriate measures must therefore not only promote individual health behaviours (e.g. only exercise), but create the conditions that people need in order to realise their greatest possible health potential in different areas. Moreover, it is also important to mention here that although improved health-related behaviour is beneficial at the individual level, a plant-based diet with plenty of fruit and vegetables and increased physical activity through walking and cycling instead of using motorised transport can also contribute to protecting the climate [59].

This study demonstrates the need for measures that encourage people to develop and maintain behaviours that are beneficial to their health in their everyday life beyond young adulthood. Overall, the data suggest that certain health-promoting and certain risky behaviours can occur together. Therefore, approaches are needed that account for the interactive nature of various health-related behaviours. Effective approaches are required that enable people to change multiple health-related behaviours. Moreover, these approaches also need to be gender-sensitive and to be conceived and made particularly accessible to socially disadvantaged groups.

Corresponding author
Dr Almut Richter
Robert Koch Institute
Department of Epidemiology and Health Monitoring
General-Pape-Str. 62–66
12101 Berlin, Germany
E-mail: RichterA@rki.de

Please cite this publication as
Richter A, Schienkiewitz A, Starker A, Krug S, Domanska O et al. (2021) Health-promoting behaviour among adults in Germany – Results from GEDA 2019/2020-EHIS. Journal of Health Monitoring 6(3): 26–44. DOI 10.25646/8553.2

The German version of the article is available at:
www.rki.de/journalhealthmonitoring

Data protection and ethics

GEDA 2019/2020-EHIS is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The Ethics Committee of the Charité – Universitätsmedizin Berlin assessed the ethics of the study and approved the implementation of the study (application number EA2/070/19).

Participation in the study was voluntary. The participants were informed about the aims and contents of the study and about data protection. Informed consent was obtained verbally.

Funding

GEDA 2019/2020-EHIS was funded by the Robert Koch Institute and the German Federal Ministry of Health.

Conflicts of interest

The authors declared no conflicts of interest.

Acknowledgment

Our thanks primarily go to the participants of the GEDA 2019/2020-EHIS study.

We would also like to thank Stefan Damerow, Jennifer Allen, Johannes Lemcke, Franziska Prütz and Alexander Rommel from the Department of Epidemiology and Health Monitoring at the Robert Koch Institute for providing text modules describing the GEDA 2019/2020-EHIS study.

References

1. Wengler A, Rommel A, Plaß D et al. (2021) Verlorene Lebensjahre durch Tod. Dtsch Arztebl International 118(9):137–144
2. World Health Organization (2004) Global Strategy on Diet, Physical Activity and Health. WHO, Geneva
3. Ding D, Rogers K, van der Ploeg H et al. (2015) Traditional and Emerging Lifestyle Risk Behaviors and All-Cause Mortality in Middle-Aged and Older Adults: Evidence from a Large Population-Based Australian Cohort. PLoS Med 12(12):e1001917
4. Khaw KT, Wareham N, Bingham S et al. (2008) Combined impact of health behaviours and mortality in men and women: the EPIC-Norfolk prospective population study. PLoS Med 5(1):e12
5. Kirkegaard H, Johnsen NF, Christensen J et al. (2010) Association of adherence to lifestyle recommendations and risk of colorectal cancer: a prospective Danish cohort study. BMJ 341:c5504
6. Krokstad S, Ding D, Grunseit AC et al. (2017) Multiple lifestyle behaviours and mortality, findings from a large population-based Norwegian cohort study – The HUNT Study. BMC Public Health 17(1):58
7. Loef M, Walach H (2012) The combined effects of healthy lifestyle behaviors on all cause mortality: a systematic review and meta-analysis. Prev Med 55(3):163–170
8. Barbaresko J, Rienks J, Nothlings U (2018) Lifestyle Indices and Cardiovascular Disease Risk: A Meta-analysis. Am J Prev Med 55(4):555–564
9. Li Y, Pan A, Wang DD et al. (2018) Impact of Healthy Lifestyle Factors on Life Expectancies in the US Population. Circulation 138(4):345–355
10. Marques A, Peralta M, Martins J et al. (2019) Few European Adults are Living a Healthy Lifestyle. Am J Health Promot 33(3):391–398
11. Buttery AK, Mensink GBM, Busch MA (2015) Healthy behaviours and mental health: findings from the German Health Update (GEDA). Eur J Public Health 25(2):219–225
12. Robert Koch-Institut (RKI) (Ed) (2017) Gesundheitliche Ungleichheit in verschiedenen Lebensphasen. Gesundheitsberichterstattung des Bundes. Gemeinsam getragen von RKI und Destatis. RKI, Berlin
13. Kurth BM, Lange C, Kamtsiuris P et al. (2009) Gesundheitsmonitoring am Robert Koch-Institut. Sachstand und Perspektiven. Bundesgesundheitsbl 52:557–570

14. Lange C, Jentsch F, Allen J et al. (2015) Data Resource Profile: German Health Update (GEDA) – the health interview survey for adults in Germany. Int J Epidemiol 44(2):442–450

15. Lange C, Finger JD, Allen J et al. (2017) Implementation of the European health interview survey (EHIS) into the German health update (GEDA). Arch Public Health 75:40

16. European Commission, Eurostat (2018) European Health Interview Survey (EHIS wave 3). Methodological manual. European Commission, Luxembourg

17. von der Heyde C (2013) Das ADM-Stichprobensystem für Telefonbefragungen. https://www.gessgroup.de/wp-content/uploads/2016/09/Beschreibung-ADM-Telefonstichproben_DE-2013.pdf (As at 16.06.2021)

18. American Association for Public Opinion Research (AAPOR) (2016) Standard definitions – final disposition codes of case codes and outcome rates for surveys. AAPOR, Deerfield

19. Allen J, Born S, Damerow S et al. (2021) German Health Update (GEDA 2019/2020-EHIS) – Background and methodology. Journal of Health Monitoring 6(3):66–79. https://www.rki.de/johm-en-2021 (As at 15.09.2021)

20. Bush K, Kivlahan DR, McDonell MB et al. (1998) The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Arch Intern Med 158(16):1789–1795

21. Burger M, Brönstrup A, Pietrzik K (2004) Derivation of tolerable upper alcohol intake levels in Germany: a systematic review of risks and benefits of moderate alcohol consumption. Prev Med 39(1):111–127

22. Seitz H, Bühringer G, Mann K (2007) Empfehlungen des wissenschaftlichen Kuratoriums der DHS zu Grenzwerten für den Konsum alkoholischer Getränke. Deutsche Hauptstelle für Suchtfragen (DHS), Hamm

23. World Health Organization (WHO) (2010) Global recommendations on physical activity for health. WHO, Geneva

24. World Health Organization (2020) WHO guidelines on physical activity and sedentary behaviour. WHO, Geneva

25. Finger JD, Tafforeau J, Gisle L et al. (2015) Development of the European Health Interview Survey. Physical Activity Questionnaire (EHIS-PAQ) to monitor physical activity in the European Union. Arch Public Health 73:59

26. World Health Organization (2000) Obesity: preventing and managing the global epidemic. Technical Report Series 894. WHO, Geneva

27. UNESCO Institute for Statistics (2012) International Standard Classification of Education ISCED 2011. http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf (As at 15.03.2021)

28. Adams ML, Katz DL, Shenson D (2016) A healthy lifestyle composite measure: Significance and potential uses. Prev Med 84:41–47

29. Reeves MJ, Rafferty AP (2005) Healthy lifestyle characteristics among adults in the United States, 2000. Arch Intern Med 165(8):854–857

30. Lee Y, Back JH, Kim J et al. (2012) Clustering of multiple healthy lifestyles among older Korean adults living in the community. Geriatr Gerontol Int 12(3):515–523

31. Ryu S, Park J, Choi S et al. (2014) Associations between socio-demographic characteristics and healthy lifestyles in Korean Adults: the result of the 2010 Community Health Survey. J Prev Med Public Health 47(2):113–123

32. Manz K, Mensink GBM, Finger JD et al. (2019) Associations between Physical Activity and Food Intake among Children and Adolescents: Results of KiGGS Wave 2. Nutrients 11:1060

33. Robert Koch-Institut (Ed) (2020) Gesundheitliche Lage der Frauen in Deutschland. Gesundheitsberichterstattung des Bundes. Gemeinsam getragen von RKI und Destatis. RKI, Berlin

34. Finger JD, Hoebel J, Kuntz B et al. (2019) Educational differences in the prevalence of behavioural risk factors in Germany and the EU – Results from the European Health Interview Survey (EHIS) 2. Journal of Health Monitoring 4(4):29–47. https://edoc.rki.de/handle/176904/6246 (As at 16.06.2021)

35. Finger JD, Busch MA, Heidemann C et al. (2019) Time trends in healthy lifestyle among adults in Germany: Results from three national health interview and examination surveys between 1990 and 2011. Plos One 14(9):e0222218

36. Noble N, Paul C, Turon H et al. (2015) Which modifiable health risk behaviours are related? A systematic review of the clustering of Smoking, Nutrition, Alcohol and Physical activity ('SNAP') health risk factors. Prev Med 81:16–41

37. MacArthur G, Caldwell DM, Redmore J et al. (2018) Individual-, family-, and school-level interventions targeting multiple risk behaviours in young people. Cochrane Database Syst Rev 10:CD009927

38. Deutsche Adipositas-Gesellschaft (DAG) e.V., Deutsche Diabetes Gesellschaft (DDG), Deutsche Gesellschaft für Ernährung (DGE) e.V., Deutsche Gesellschaft für Ernährungsmedizin (DGEM) e.V. (2014) Interdisziplinäre Leitlinie der Qualität S3 zur „Prävention und Therapie der Adipositas“. https://www.awmf.org/uploads/tx_szleitlinien/050-001l_S3_Adipositas_Pr%C3%A4vention_Therapie_2014-11-abgelaufen.pdf (As at 16.06.2021)

39. Nyberg ST, Singh-Manoux A, Pentti J et al. (2020) Association of Healthy Lifestyle With Years Lived Without Major Chronic Diseases. JAMA Intern Med 180(5):760–768

40. May AM, Struijk EA, Fransen HP et al. (2015) The impact of a healthy lifestyle on Disability-Adjusted Life Years: a prospective cohort study. BMC Med 13:39

41. Connor Gorber S, Tremblay M, Moher D et al. (2007) A comparison of direct vs. self-report measures for assessing height, weight and body mass index: a systematic review. Obes Rev 8(4):307–326

42. Degenhardt L, Charlson F, Ferrari A et al. (2018) The global burden of disease attributable to alcohol and drug use in 195 countries and territories, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Psychiatry 5(12):987–1012

43. Damerow S, Rommel A, Prütz F et al. (2020) Developments in the health situation in Germany during the initial stage of the COVID-19 pandemic for selected indicators of GEDA 2019/2020-EHIS. Journal of Health Monitoring 5(4):3–20. https://edoc.rki.de/handle/176904/7550.2 (As at 16.06.2021)

44. Jordan S, Starker A, Krug S et al. (2020) Health behaviour and COVID-19: Initial findings on the pandemic. Journal of Health Monitoring 5(S8):2–14. https://edoc.rki.de/handle/176904/7491 (As at 16.06.2021)

45. Courtenay WH (2000) Constructions of masculinity and their influence on men's well-being: a theory of gender and health. Soc Sci Med 50(10):1385–1401

46. Deitermann B, Patzelt C, Heim S et al. (2011) Erfolgreiche Prävention braucht eine geschlechtergerechte Ansprache. Public Health Forum 19(2):9.e1–9.e3

47. Reifegerste D (2019) Geschlechtersensible Gesundheitskommunikation. Public Health Forum 27(2):154–156

48. Fleming PJ, Lee JG, Dworkin SL (2014) "Real men don't": constructions of masculinity and inadvertent harm in public health interventions. Am J Public Health 104(6):1029–1035

49. Brandt T, Gencer H, Jahn I (2019) Gendertransformative Prävention und Gesundheitsförderung. Public Health Forum 27(2):126–128

50. Bourassa KJ, Ruiz JM, Sbarra DA (2019) Smoking and Physical Activity Explain the Increased Mortality Risk Following Marital Separation and Divorce: Evidence From the English Longitudinal Study of Ageing. Ann Behav Med 53(3):255–266

51. Dinour L, Leung MM, Tripicchio G et al. (2012) The Association between Marital Transitions, Body Mass Index, and Weight: A Review of the Literature. J Obes 2012:294974

52. Sauter A, Curbach J, Rueter J et al. (2019) German senior citizens' capabilities for physical activity: a qualitative study. Health Promot Int 34(6):1117–1129

53. Rueter J, Brandstetter S, Curbach J et al. (2020) How Older Citizens in Germany Perceive and Handle Their Food Environment – A Qualitative Exploratory Study. Int J Environ Res Public Health 17(19)

54. Grittner U, Kuntsche S, Gmel G et al. (2013) Alcohol consumption and social inequality at the individual and country levels – results from an international study. Eur J Public Health 23(2):332–339

55. Bloomfield K, Grittner U, Kramer S et al. (2006) Social inequalities in alcohol consumption and alcohol-related problems in the study countries of the EU concerted action 'Gender, Culture and Alcohol Problems: a Multi-national Study'. Alcohol and alcoholism 41(suppl_1):i26–i36

56. Schnuerer I, Gaertner B, Baumann S et al. (2013) Gender-specific predictors of risky alcohol use among general hospital inpatients. Gen Hosp Psychiatry 35(1):9–15

57. Devaux M, Sassi F (2015) Alcohol consumption and harmful drinking: Trends and social disparities across OECD countries", OECD Health Working Papers, No. 79. OECD Publishing, Paris. https://www.oecd-ilibrary.org/content/paper/5js1qwkz2p9s-en (As at 10.03.2021)

58. World Health Organization (1986) Ottawa Charter on Health Promotion. WHO, Kopenhagen

59. Bundesministerium für Umwelt Naturschutz und nukleare Sicherheit (Ed) (2020) Fakten, Trends und Impulse deutscher Klimapolitik. Ausgabe 2020. https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/klimaschutz_zahlen_2020_broschuere_bf.pdf (As at 16.06.2021)

Annex Table 1
Proportion of achieved points in health-promoting lifestyle by gender and age (n=11.469 women, n=10.337 men)
Source: GEDA 2019/2020-EHIS

Points	Total	Age group 18–29 years	30–44 years	45–64 years	≥65 years
Women					
0 or 1	8.3%	8.6%	9.0%	10.6%	4.7%
2	24.0%	19.3%	21.8%	24.2%	28.0%
3	32.2%	26.4%	31.7%	31.7%	36.2%
4	25.1%	31.0%	25.8%	23.5%	23.4%
5	10.5%	14.8%	11.7%	10.0%	7.7%
Men					
0 or 1	15.3%	9.2%	16.8%	20.6%	10.4%
2	30.3%	23.3%	31.4%	32.1%	31.9%
3	32.2%	34.1%	30.6%	29.4%	37.0%
4	17.4%	25.7%	16.7%	14.9%	15.5%
5	4.7%	7.7%	4.6%	3.0%	5.2%

Imprint

Journal of Health Monitoring

Publisher
Robert Koch Institute
Nordufer 20
13353 Berlin, Germany

Editors
Johanna Gutsche, Dr Birte Hintzpeter, Dr Franziska Prütz, Dr Martina Rabenberg, Dr Alexander Rommel, Dr Livia Ryl, Dr Anke-Christine Saß, Stefanie Seeling, Dr Thomas Ziese
Robert Koch Institute
Department of Epidemiology and Health Monitoring
Unit: Health Reporting
General-Pape-Str. 62–66
12101 Berlin, Germany
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Kerstin Möllerke, Alexander Krönke

Translation
Simon Phillips/Tim Jack

ISSN 2511-2708

Note
External contributions do not necessarily reflect the opinions of the Robert Koch Institute.

Erratum, page 43
In the 'Annex Table 1' table on page 43, the naming of the five results columns (four age groups plus total) was inadvertently shifted, resulting in incorrect headings above the correct percentages. The article has been corrected.

The Robert Koch Institute is a Federal Institute within the portfolio of the German Federal Ministry of Health

Journal of Health Monitoring · 2021 6(3)
DOI 10.25646/8555
Robert Koch Institute, Berlin

Franziska Prütz, Alexander Rommel,
Julia Thom, Yong Du,
Giselle Sarganas, Anne Starker

Robert Koch Institute, Berlin
Department of Epidemiology and
Health Monitoring

Submitted: 03.05.2021
Accepted: 25.06.2021
Published: 15.09.2021

Utilisation of outpatient medical services in Germany – Results from GEDA 2019/2020-EHIS

Abstract

Outpatient health care provision plays an important role in the identification and treatment of health problems. Data are needed on the utilisation of health care services and their determinants to enable health policy decision-making and needs-based care provision. The analyses set out in this article are based on current data on the utilisation of outpatient health care services. The data stem from the German Health Update (GEDA 2019/2020-EHIS), a nationwide cross-sectional survey of the resident population in Germany that is undertaken as part of the health monitoring conducted at the Robert Koch Institute.

Around 80% of the population aged 18 or over were treated at least once within twelve months by a general practitioner, 60% by a specialist, and 10% received psychiatric or psychotherapeutic treatment. Less than half of those eligible had had a stool test during the past two years, and just over half had had a colonoscopy in the past ten years. Around 80% of women and 70% of men had had their blood pressure checked within the last year, and 60% had had their blood cholesterol or blood sugar levels monitored. Over 50% reported that they had taken medically prescribed drugs in the past two weeks. In general, most of the indicators under study suggest that utilisation increases with age and that utilisation is higher among women than men, with the exception of psychiatric and psychotherapeutic services, among others.

OUTPATIENT CARE · CANCER SCREENING · PSYCHOTHERAPY · BLOOD PRESSURE MONITORING · MEDICATION

1. Introduction

Outpatient health care plays an important role in identifying and treating health problems. The largest area is outpatient medical care and psychotherapy. In Germany, these services are mainly provided by office-based physicians and psychotherapists. As they are generally the first point of contact in the health care system, they determine the need for and provide treatment, carry out examinations, and, if necessary, arrange for the provision of further health care and social services [1]. Around 90% of adults in Germany utilise outpatient medical or psychotherapeutic services every year [2].

Medical care also includes blood pressure monitoring, and cholesterol and blood sugar tests. These tests play a key role in the prevention, diagnosis and management of cardiovascular diseases and diabetes, and are important aspects of quality of care. Health surveys have identified a significant increase in the number of blood pressure check-ups conducted among people with high blood pressure [3]

GEDA 2019/2020-EHIS

Fifth follow-up survey of the German Health Update

Data holder: Robert Koch Institute

Objectives: Provision of reliable information on the health status, health behaviour and health care of the population living in Germany, with the possibility of European comparisons

Study design: Cross-sectional telephone survey

Population: German-speaking population aged 15 and older living in private households that can be reached via landline or mobile phone

Sampling: Random sample of landline and mobile telephone numbers (dual-frame method) from the ADM sampling system (Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V.)

Sample size: 23,001 respondents

Study period: April 2019 to September 2020

GEDA survey waves:
- GEDA 2009
- GEDA 2010
- GEDA 2012
- GEDA 2014/2015-EHIS
- GEDA 2019/2020-EHIS

Further information in German is available at www.geda-studie.de

and a decrease in undetected high blood pressure [4] and unknown diabetes [5] in Germany between 1997/1998 and 2008 to 2011.

Medication is also an essential aspect of the treatment of health impairments, disorders, and diseases. Between 2014 and 2015, more than half of the population took medication prescribed by a doctor within a two-week period; among people 65 or above it was over 85% [6].

Preventive care, which includes vaccinations and cancer screening, also falls under the responsibility of outpatient health care. As such, preventive care also includes colorectal cancer screening, which is offered to people with statutory health insurance aged 50 or above in the form of stool tests and colonoscopies at different intervals depending on their age and sex. The costs are covered by statutory health insurers, and utilisation is voluntary [7]. Organised colorectal cancer screening was established in July 2019 in Germany and it involves inviting patients to screening and providing them with information about the screening. Previously, claims data from statutory health insurers in Germany demonstrated that around 18% of those eligible had undertaken a stool test for hidden blood (2017–2018) and that around 15% had undergone a colonoscopy (2009–2018) [8]. It should be noted that in addition to colorectal cancer screening, colonoscopies are also used to determine the cause of symptoms, which leads to its higher overall utilisation [9].

Andersen's Behavioural Model of Health Services Use describes a number of factors that influence the utilisation of health services [10, 11]. Andersen distinguishes between three groups of factors: (i) predisposing factors such as sex, age, education and professional status, (ii) enabling factors, e.g. income, types of health insurance and the accessibility of facilities, and (iii) need factors, of which a person's health plays a central role [10]. If predisposing or enabling factors have a strong impact on utilisation that cannot be explained by different medical needs can result in the development of social inequalities in health care provision.

In order to develop health policy and ensure needs-based care provision, including the avoidance of overuse, underuse and misuse, information is required about the utilisation of health care services and their determinants [12]. For example, people with depressive symptoms seek help much more often in regions with a relatively large number of psychotherapists [13]. Analyses of the use of outpatient care can be carried out using claims data from health insurers and associations of statutory health insurance physicians as well as with data from population-based surveys. Survey data on utilisation are available, among others, from the health monitoring at the Robert Koch Institute. In contrast to claims data, survey data enable a more differentiated description of social and other determinants [14–16].

This article is based on key data from the study GEDA 2019/2020-EHIS on the current utilisation of general and specialist medical services, including psychiatric and psychotherapeutic care, by adults in Germany. It sets out results on the utilisation of selected outpatient services: stool test, colonoscopy, measurement of blood pressure, blood cholesterol and blood sugar by health professionals, and the utilisation of medically prescribed drugs. With regard to the factors influencing the utilisation of outpatient services, we focus on the predisposing factors of age, gender and education.

Around 80% of the population aged 18 or above used general practitioner services at least once a year. Around 60% seeked specialist medical care.

2. Methodology

2.1 Study design and sample

The German Health Update (GEDA) is a nationwide cross-sectional survey of the resident population in Germany. The GEDA study has been conducted by the Robert Koch Institute (RKI) on behalf of the German Federal Ministry of Health at multi-year intervals since 2008 and is part of the health monitoring at the RKI [17, 18]. The fifth follow-up survey, GEDA 2019/2020-EHIS, took place between April 2019 and September 2020. As in the 2014/2015 wave, the questionnaire of the European Health Interview Survey (EHIS) was fully integrated [19, 20]. GEDA 2019/2020-EHIS was conducted as a telephone interview survey using a computer assisted, fully structured interview (i.e. Computer Assisted Telephone Interview, CATI). It was based on a random sample of landline and mobile telephone numbers (dual-frame method) [21]. The sample comprised the population aged 15 years and older living in private households and with permanent residency in Germany. A total of 23,001 people provided complete interviews for the GEDA 2019/2020-EHIS study. Based on the standards of the American Association for Public Opinion Research (AAPOR), the response rate was 21.6% (RR3) [22]. A detailed description of the methodology used for GEDA 2019/2020-EHIS, including an explanation and differentiated presentation of the response rates, can be found in Allen et al. in this issue of the Journal of Health Monitoring [23].

2.2 Indicators

Utilisation of medical services

Data on the utilisation of medical services were collected using the question: 'When was the last time you consulted a GP (general practitioner) or family doctor on your own behalf?'. The question on the utilisation of specialist services used a similar wording asking for consultations with medical or surgical specialists. Two dichotomous variables were formed to differentiate between respondents who had seen a GP, as well as those who had consulted a specialist in the last twelve months, from respondents who had not sought the corresponding medical care during this period.

Utilisation of psychiatric and psychotherapeutic services

Data on the utilisation of specialist mental health services were specifically recorded for psychological complaints and mental disorders. The participants were asked: 'In the past twelve months have you visited on your own behalf a psychologist, psychotherapist or psychiatrist for counseling, examination or treatment?'. The possible responses were 'Yes','No', 'Don't know' and 'Prefer not to answer'. When 'psychotherapeutic and psychiatric services' are referred to in the following, they also include services provided by psychologists without a licence to practice medicine, such as those provided in the context of outpatient addiction counselling.

Utilisation of stool test and colonoscopy

GEDA 2019/2020-EHIS collected data on colorectal cancer screening using the following questions: 'When was the last time you had a test for hidden blood in your stool?' and 'When was the last time you had a colonoscopy?'. The

possible responses were periods ranging from 'Within the last twelve months' to 'Ten years ago or longer'. The respondents could also answer 'Never'. The resulting data can be used to assess whether the last examination took place in accordance with the guidelines for colon cancer screening [7]. The analyses are based on routine stool tests and colonoscopies. This means a stool test within the last twelve months for women and men aged between 50 and 54; a stool test within the last two years for women and men aged 55 or over; and a colonoscopy within the last ten years for men aged 50 or above, and for women aged 55 or above.

Blood pressure, blood cholesterol and blood sugar measurement by health professionals

Data was collected on blood pressure measurement conducted by health professionals by asking: 'When was the last time that your blood pressure was measured by a health professional?'. Five possible responses were given: 'Within the past twelve months', 'One to less than three years', 'Three to less than five years', 'Five years or more' and 'Never'. The answers were used to establish a dichotomous variable for blood pressure checks in the last twelve months ('yes'/'no'). The questions used for blood cholesterol and blood sugar measurements by medical professionals in the last twelve months used similar wording.

Utilisation of medically prescribed drugs

Data on the utilisation of medically prescribed drugs in the two weeks prior to the survey is depicted using the prevalence of current prescription medication. The participants were asked: 'During the past two weeks, have you used any medicines that were prescribed for you by a doctor? Exclude contraceptive pills or hormones used solely for contraception'. The possible responses were 'Yes', 'No', 'Don't know' and 'Prefer not to answer'.

Sociodemography

In addition to age, respondents' gender and education were also taken into account as determinants of health care utilisation. GEDA 2019/2020-EHIS used gender identities to describe gender differences and allowed the respondents to indicate which gender they felt they belonged to. Respondents 18 years and older included 11,959 women and 10,687 men. 62 respondents provided a different gender identity to the one that they were assigned at birth or gave no information at all. These individuals are not included in the gender stratified analyses.

The International Standard Classification of Education (ISCED) was used to classify the information provided by the study participants on education [24]. ISCED takes into account both school and vocational qualifications and is particularly suitable for international comparisons. ISCED categories 0 to 2 were grouped into a low, 3 to 4 into a medium and 5 to 8 into a high education group.

2.3 Statistical analyses

The analyses are based on data from 22,646 participants (11,959 women, 10,687 men) aged 18 to 99. Depending on the indicator, participants without information on the variables on which an indicator is based were excluded from the analyses (27 for GPs, 60 for specialists, 11 for psychiatric and psychotherapeutic services, 179 for blood pressure, 684 for blood cholesterol, 1,100 for blood sugar and 3 for

medically prescribed drugs). The analysis of utilisation of stool test is based on data from 5,507 participants (3,058 women, 2,449 men). The utilisation of colonoscopy is based on data from 8,408 participants (4,329 women, 4,079 men).

The analyses were carried out using a weighting factor to correct the sample for deviations from the population structure. Design weighting was first carried out for the different selection probabilities (mobile and landline). This was followed by an adjustment to the official population figures based on age, sex, federal state and district type (as of 31 December 2019). Adjustments were also undertaken to ensure the data reflected the education distribution identified by the 2017 microcensus. This was conducted in accordance with ISCED classifications [27].

The analyses were carried out with SAS 9.4. In order to properly account for the weighting when calculating confidence intervals and p-values, all analyses were undertaken using SAS survey procedures. A statistically significant difference between groups is assumed where p-values are less than 0.05.

Psychiatric and psychotherapeutic services are most commonly utilised by women aged between 18 and 29.

3. Results

3.1 General practitioner and specialist utilisation

84.2% of women and 79.5% of men reported seeing a GP in the last twelve months. Specialist medical services were used less often (women 67.8%, men 53.3%). The utilisation of medical services tends to increase with age while gender differences towards a higher utilisation among women remain (Figure 1 and Annex Table 1). With regard to education, there is a tendency towards a greater utilisation of GP services by people from the lower education group compared with those from the medium and higher education group. The opposite correlation can be found for specialist services, with a more frequent utilisation by people from the higher education group. This relationship is much more pronounced among women than men (Figure 5, Figure 6 and Annex Table 1).

3.2 Utilisation of psychiatric and psychotherapeutic services

12.7% of women and 8.9% of men reported that they have used psychotherapeutic and psychiatric services in the past twelve months. The frequency differs between age groups. People aged 65 or over report the lowest utilisation of these services (women 5.3%, men 3.8%). Women between the ages of 18 and 29 do so almost four times as often, at 19.2%. For men, those aged between 45 and 64 most frequently reported having used psychotherapeutic and psychiatric services, at 11.6%, which is about three times the rate identified for men aged 65 or above (Figure 1 and Annex Table 1). Gender differences are also evident when comparing education groups. Although there is no evidence of an educational gradient among women, men in the lower education group seek specialist care for psychological complaints and mental disorders roughly twice as often (13.0%) as men in the higher education group (6.7%) (Figure 5, Figure 6 and Annex Table 1).

3.3 Utilisation of stool test and colonoscopy

In line with the recommendations, around a third of women (34.2%) and around one fifth of men (20.2%) between the ages of 50 and 54 reported having had a stool test in the

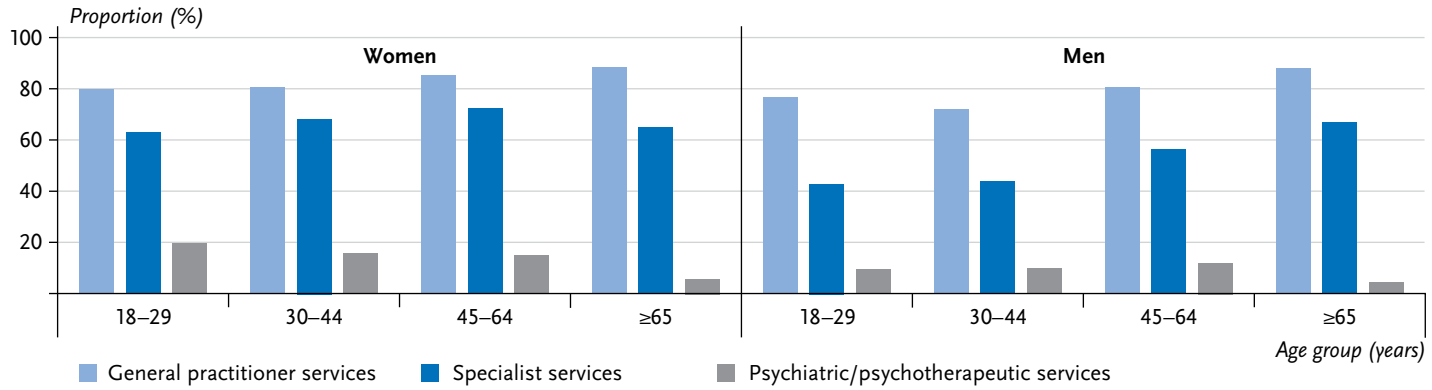


Figure 1
Utilisation of general practitioner, specialist, and psychiatric/psychotherapeutic services in the last twelve months by gender and age (general practitioner services n=11,945 women, n=10,675 men; specialist services n=11,925 women, n=10,663 men; psychiatric/psychotherapeutic services n=11,953 women, n=10,682 men)
Source: GEDA 2019/2020-EHIS

last twelve months. This difference is significant (data not shown). Considerably more people had a test within the last two years, although hardly any differences were identified in this case between women and men (Figure 2 and Annex Table 2). It is particularly striking that women's utilisation of stool tests decreases with age: significantly fewer women in other age groups reported a test compared with 55- to 59-year-olds. In contrast, utilisation of stool test tends to increase with age among men. The data show that colonoscopies are reported significantly more often by people aged 60 or above than by younger people.

The utilisation of colonoscopies, which rises with age, is not associated with education level or gender.

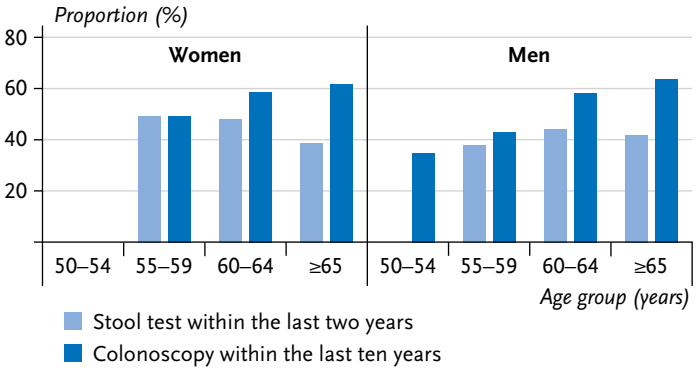
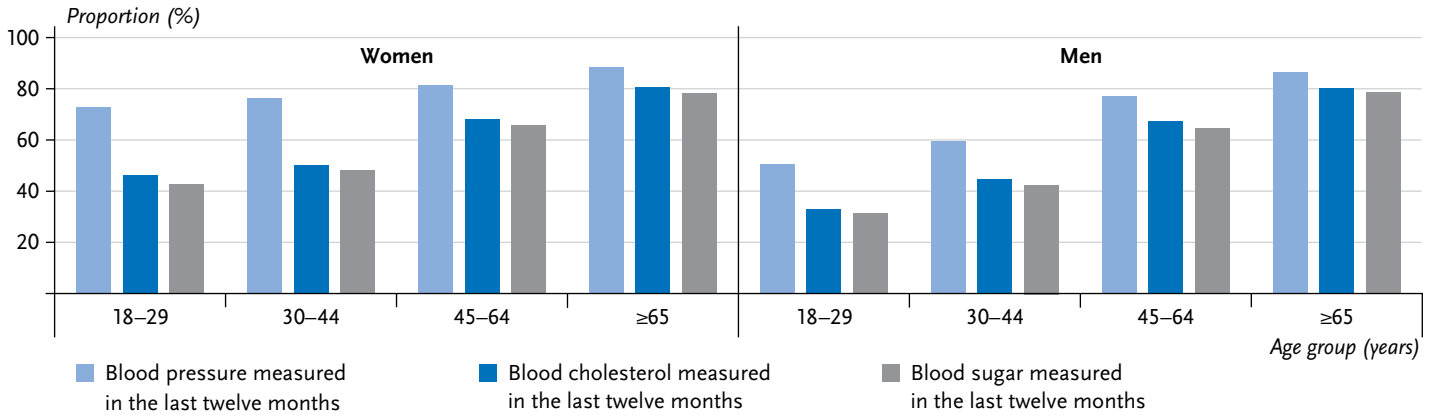


Figure 2
Utilisation of stool test and colonoscopy by gender and age (Stool test n=3,058 women, n=2,449 men; colonoscopy n=4,329 women, n=4,079 men)
Source: GEDA 2019/2020-EHIS

3.4 Blood pressure, blood cholesterol and blood sugar measurement by health professionals

The percentage of women and men who reported having had a blood pressure check-up undertaken by a health care professional in the past twelve months was 81.0% and 70.7%, respectively. These figures increase significantly with age for both genders. Moreover, they are also significantly higher among women in the 18-to-29 and 30-to-44 age groups than among men of the same age. However, no gender differences were identified among 45- to 64-year-olds or people aged 65 or over (Figure 3). Similar results were obtained for blood cholesterol and blood sugar. For example, 64.7% of women and 59.4% of men report that their blood cholesterol had been checked by health professionals in the last twelve months. 62.3% of women and 57.4% of men report that their blood sugar has been measured by health professionals in the past twelve months. The proportion of people who have had their blood cholesterol and blood sugar levels tested also increases significantly with age. Significant gender differences were only

Figure 3
Blood pressure, blood cholesterol, and blood sugar measurement by health professionals in the last twelve months by gender and age (Blood pressure measurement n=11,873 women, n=10,597 men; blood cholesterol n=11,622 women, n=10,341 men; blood sugar n=11,383 women, n=10,168 men)
Source: GEDA 2019/2020-EHIS



The utilisation of blood pressure, blood cholesterol and blood sugar check-ups increases with age and is more common among women than men, and particularly among 18- to 44-year-old women.

identified between 18- to 29- and 30- to 44-year-olds (Figure 3). With regard to education, no differences were identified for blood pressure and blood cholesterol between people from the lower education group and those from the medium and higher education groups. A smaller proportion of men in the lower education group reported blood sugar check-ups than men in the medium and higher education groups (Figure 6). In women, a clear educational gradient was identified for blood cholesterol and blood sugar measurements, but not for blood pressure. A higher proportion of women in the lower education group reported blood cholesterol and blood sugar measurements than women in the medium and higher education groups (Figure 5).

3.5 Utilisation of medically prescribed drugs

More than half of the study participants (59.2% of woman, 50.6% of men) reported that they had used medically prescribed drugs in the last two weeks (Figure 4 and Annex Table 1). The prevalence differs significantly during the life course and increases with age: in the youngest age group (18 to 29 years), 36.9% of women and 20.7% of men had used medication prescribed by a doctor in the last two weeks, whereas the prevalence among people aged 65 or above was much higher (83.6% for women and 83.0% for men). Gender differences were recorded in the 18-to-29, 30-to-44 and 45-to-64 age groups, with significantly higher prevalences among women than men. From the age of 65, the prevalences level out. Women from the lower education group (69.3%) have a significantly higher prevalence of medically prescribed drug use than women from the higher education group (50.2%) (Figure 5 and Figure 6).

Figure 4
Utilisation of medically prescribed drugs in the last two weeks by gender and age (n=11,958 women, n=10,686 men)
Source: GEDA 2019/2020-EHIS

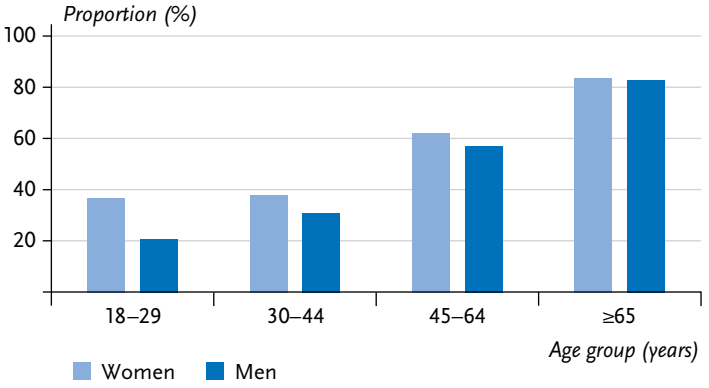
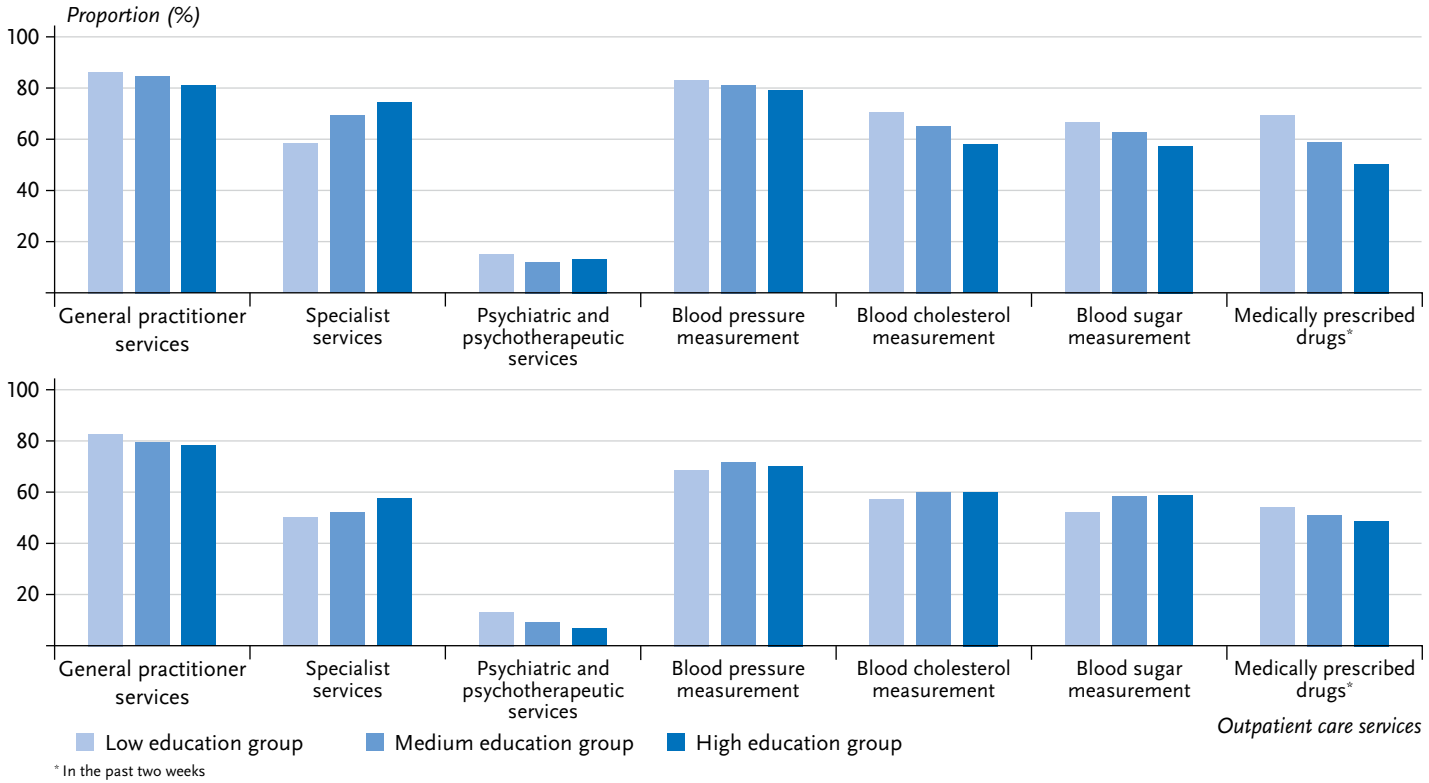


Figure 5 (above)
Utilisation of outpatient care services in the last twelve months among women by education level
Source: GEDA 2019/2020-EHIS

Figure 6 (below)
Utilisation of outpatient care services in the last twelve months among men by education level
Source: GEDA 2019/2020-EHIS



The utilisation of medically prescribed drugs is higher among women, the elderly and people in the lower education group.

This social gradient was also observed in men, but was not found to be statistically significant.

4. Discussion

This article describes key data on the utilisation of outpatient health care services in Germany. In addition to certain preventive services (colorectal cancer screening), focus is placed on the utilisation of general practitioner, specialist and psychiatric/psychotherapeutic services, important medical check-ups and medication. The analyses demonstrate a tendency towards differences by gender in the sense of a higher utilisation of health services by women. Many health services are also used more frequently with increasing age, and educational differences were observed for some of the indicators.

4.1 Utilisation of services provided by general practitioners and specialists

Around eight out of ten respondents used general practitioners in the twelve months prior to the survey. Specialist medical services were utilised by around six out of ten respondents within the last year and, thus, somewhat less often. Previous studies have demonstrated a relatively high

utilisation of outpatient medical services in Germany [2, 26]. An initial analysis of the GEDA 2019/2020-EHIS data over time in the initial phase of the COVID-19 pandemic showed that the utilisation of general and specialist medical services fell briefly, albeit significantly, in 2020 when containment measures were in place [27]. This study presumably therefore slightly underestimates the utilisation of outpatient medical services in terms of the average level over the entire study period. A higher level of utilisation with increasing age as a result of increasing morbidity is also well documented in the literature on factors influencing the utilisation of many health services; as is the generally higher level among women [11, 26]. Gender differences are often explained in terms of women having a higher physical sensitivity and a greater willingness to accept help and to make greater use of preventive services. Men are viewed as more inclined to take advantage of medical services only after diseases already have appeared [26]. This also explains the trend towards a decrease in gender differences with increasing age as more treatment is needed in older age due to rising morbidity. Socioeconomic differences in health care can already be found in childhood [28]. In addition, the tendency towards a higher utilisation of general medical services with decreasing socioeconomic status is also well-known. In the present analysis this was operationalised using the respondents' educational level. The findings go hand in hand with the tendency of people with a higher socioeconomic status to make greater use of specialist medical services [29, 30]. These socioeconomic differences are partly explained by the fact that in Germany, people with lower socioeconomic status often use general practitioners as gatekeepers (i.e. people who guide them through the health system) and only utilise specialist services on their advice [31]. The differences between health systems in Europe mean that Europe-wide comparisons are only possible to a limited extent. Data from EHIS Wave 2 for 2014 show that both the outpatient utilisation of GP and specialist medical services are relatively high in Germany compared with other EU member states; the utilisation of psychiatric and psychotherapeutic services is also above the EU average [32].

4.2 Utilisation of psychiatric and psychotherapeutic services

12.8% of women and 8.9% of men reported having had psychotherapeutic or psychiatric counselling or treatment in the past twelve months. Data from BARMER health insurance for 2018 also show that a comparable proportion of the population was treated by psychological psychotherapists (3.1%) and psychiatrists and neurologists (10.9%) [33]. Assuming that 27.8% of the population are affected by a mental disorder at least once a year [34, 35], the utilisation of specialist services can be described as low. Given the fact that almost three quarters of patients with a documented diagnosis of a mental disorder only received treatment from a GP or specialist in somatic medicine [36], a treatment gap in the provision of care for mental health is discussed.

Compared with the results of GEDA 2014/2015-EHIS, the analyses set out here identified a slight increase in the utilisation of psychotherapeutic and psychiatric services over time (women 11.3%, men 8.1%). This particularly applies to women in young adulthood (18 to 29 years of

age) as the figure for this group increased by 8.7 percentage points [13]. For psychotherapeutic services, this peak in the age distribution, which has become increasingly pronounced over the last few years, is also found in health insurance data [33]. Furthermore, these data demonstrate that the currently still low level of utilisation by people aged 65 or above (see also [37, 38]) has increased in recent years. Taking into account that, for example, the frequency of depression diagnoses increases with age, care provision in this context becomes increasingly needs-based over time [39]. Apart from this, the age distribution of the utilisation of psychotherapeutic services identified from data from statutory health insurers [33] differs significantly from the findings presented here, because our study includes psychiatric (and psychological) care, which are known to have different age distributions [40].

The finding that women seek psychiatric and psychotherapeutic help more often than men is confirmed by the literature [41]. Furthermore, our results demonstrate that the educational differences in the utilisation of services also vary between the genders. Men in the low education group have a more frequent rate of utilisation, reflecting that mental distress and disorders occur more frequently in people with lower income and educational and professional status [34]. Although this difference was also expected among women, no evidence was found to support it in the data used here. This could be due to the fact that social inequality in mental disorders is more pronounced in men than in women [42]. In addition, when collecting data on the utilisation of services, occupational groups were considered together, although they would presumably have to be looked at separately in this regard, too. Numerous signs indicate that especially persons with higher levels of education have easier access to outpatient psychotherapeutic services in particular, and that these seem to differ from psychiatric and possibly psychological services [33, 38, 43, 44]. Since women make more use of psychotherapy than men, this may lead to the appearance that the services are being utilised equally by women of all education groups – which is unjustified because of the social gradient of morbidity.

4.3 Utilisation of stool test and colonoscopy

The analyses of the available data show that a relatively large number of people over the age of 50 (around 40%) report having had a stool test within the last two years. The figures for a colonoscopy within the last ten years are even higher, at more than 50%. Both tests can be used preventively as part of colorectal cancer screening but also to determine the cause of symptoms. As no data was collected as part of GEDA 2019/2020-EHIS on the reasons for conducting the tests, the proportion used for screening remains unclear. However, figures can also be gained from claims data from statutory health insurers [8]. GEDA 2019/2020-EHIS identified a significantly higher rate of stool tests than found among claims data, which indicates that stool tests are often not carried out or billed as screening measures, but rather to determine the cause of symptoms. In the case of colonoscopies, the figures identified from self-reported data are significantly higher than those attained from claims data. Other studies have also identified comparatively high numbers of colonoscopies from self-reported data [45]. A study based on claims data from

AOK Hessen found the ratio of preventive to curative colonoscopies to be about 1:2 among 50- to 79-year-olds and even 1:4 among people aged 80 or above [46]. These results are therefore of a similar magnitude to those from GEDA 2019/2020-EHIS. A comparison with the data from GEDA 2014/2015-EHIS once again demonstrates very little change in the figures from self-reported data [9].

International comparisons of stool tests and colonoscopies as part of colorectal cancer screening need to be regarded with caution because of the differences between screening programs in different countries [47]. A European-wide comparison of data from EHIS Wave 2 for 2014, however, ranked Germany third after France and Slovenia in terms of utilisation of a stool test among 50- to 74-year-olds within the last two years. The European average among the then 28 member states in this age group was 31.3% [48]. The European average for colonoscopy utilisation among 55- to 64-year-olds was 25.7%. In addition to Germany, Austria and Luxembourg also reported figures over 50% [49].

Differences by gender are only apparent with regard to the stool test. Since gynaecologists can also offer this test, women may have more of an opportunity to be tested, for example during cervical cancer and breast cancer screening. This assumption ties in with the fact that women take stool tests less often as they get older. The use of the Pap smear for cervical cancer screening also decreases significantly with age [9]. This suggests that older women generally no longer regularly make use of gynaecological services [50].

In terms of colonoscopy utilisation, a significant increase with age was identified both among women and men. Colonoscopies, therefore, tend not to be undertaken at the beginning of the period in which most people are eligible. This could be due to the fact that a colonoscopy is a relatively complex and invasive procedure and therefore requires longer-term planning. In addition, the increasing utilisation of medical services by men with age could explain the increased utilisation of colonoscopies as well as rebalance the earlier differences identified between women and men [2].

4.4 Blood pressure, blood cholesterol and blood sugar measurement by health professionals

High blood pressure, blood cholesterol and blood sugar levels are major risk factors in the development of cardiovascular disease and diabetes. Regular tests can determine elevated and borderline elevated levels in people without known diseases (hypertension, hyperlipidaemia, diabetes). People with known diseases require regular monitoring of blood pressure, blood cholesterol and blood sugar levels for drug treatment, and this may even be set out in therapy guidelines. Therefore, medical services (monitoring of blood pressure, blood cholesterol and sugar) are presumably more likely to be utilised by patients with these known diseases. For example, the proportion of people with known diabetes who have had their blood sugar tested by a health professional in the past twelve months is 96.3%, compared with 56.0% for people without known diabetes (data not shown).

In Germany, people with statutory health insurance aged 35 or over are entitled to a medical health check-up, and an integral part of this check-up is a blood test for sugar and cholesterol [51]. Since April 2019, this health

check-up has been offered every three years to people aged 35 or above and once to people aged between 18 and 34 [51]. The analyses presented here show that the majority of study participants aged 18 or over had had their blood pressure, blood cholesterol and blood sugar checked by health professionals in the past twelve months. These results reflect similar figures for health check-ups in Germany. Claims data from statutory health insurers show that around half of the population with statutory health insurance aged 35 or above had a health check-up in 2017/2018 [52]. Since blood pressure measurement and diagnostic blood tests are routine aspects of health care services provided by GPs and specialists, and because the majority of women and men have received health care from a GP or specialist in the last twelve months, these figures are consistent with those on the frequency of blood pressure, blood cholesterol and blood sugar check-ups being carried out in the past twelve months.

Although the prevalence of each of the three tests increases with age, a significant difference between women and men is also identifiable [52]. Women have a higher prevalence for blood pressure testing by a health care professional. This difference was also observed from the data collected by GEDA 2014/2015-EHIS (women 83.4% vs men 72.5%). Nevertheless, those figures are for the population aged 15 and over [53]. Gender differences in awareness, management and control of hypertension are also known, but the German Health Interview and Examination Survey for Adults (DEGS1, 2008–2011) conducted by the RKI found no differences between women and men with known hypertension in terms of their uptake of blood pressure monitoring by medical professionals [54].

On the international level, the 2017 Swiss Health Survey collected data on blood pressure, blood cholesterol and blood sugar tests from the majority of the population aged 15 or over. The study found that in 2017, the blood pressure of 76.4% (women 81.7%, men 70.9%), the cholesterol level of 45.8% (women 46.7%, men 44.8%) and the blood sugar level of 51.5% (women 54.1%, men 48.8%) of the Swiss population had been measured within the last twelve months. The proportion of female participants was higher [55]. According to data from EHIS Wave 2 (2014), 51.6% of the EU population aged 15 or over reported that their blood cholesterol level had been measured within the last year; 51.0% reported a blood sugar test [48].

4.5 Utilisation of medically prescribed drugs

The utilisation of medically prescribed drugs in the two weeks prior to the survey shows the prevalence of current, medically prescribed drug use among adults in Germany. The prevalence described in this study is similar to the prevalence calculated in 2014/2015 (55.5% vs 55.1%) [6]. Significant gender differences in the utilisation of medically prescribed drugs were recorded in both GEDA 2014/2015-EHIS and GEDA 2019/2020-EHIS, especially in younger age groups (under 64 years of age), with higher prevalence among women than men. Prevalences between women and men are similar as of the age of 65. The use of prescribed medication increases with age, and this can be attributed to the increasing prevalence of chronic diseases with age [6, 56]. EHIS Wave 2 found the average utilisation of medically prescribed drugs in people aged 15 and over in the EU to be 48.6% in 2014 [57].

4.6 Strengths and Limitations

The data used for GEDA 2019/2020-EHIS is self-reported and may be affected by limitations such as recall bias. There is some evidence that the actual number of physician visits is often underestimated, particularly by older people [58]. However, this mainly applies to data collections on the number of physician visits and less to the question as to whether physicians were consulted at all. Recall bias is more likely for periods lasting longer than twelve months [59]. In addition, telephone interviews are also known to be more susceptible to socially desirable responses than face-to-face interviews, and this can especially be the case when using preventive services such as cancer screening [60].

As response rates for telephone surveys are generally lower than for face-to-face interviews, telephone-based surveys may be at a greater risk of non-response bias. However, a lower response rate does not automatically mean that the results are more strongly biased [61]. Nevertheless, there is still a possibility of selective non-participation (selection bias) [16]. People who take part in health surveys can be assumed to have a greater awareness about health and, therefore, their utilisation of outpatient health services may differ from that of the general population. Furthermore, certain population groups may be underrepresented, such as migrants who lack sufficient knowledge of German to answer the survey questions. One of the strengths of the GEDA study is that selection effects were taken into account by weighting. As such, results from the study are generalisable for Germany. In contrast to claims data, which are often only meaningful for certain groups of insurants and are limited to the information required for accounting purposes and details of prescribed medication [15, 16], survey data can provide information about people with all kinds of health insurance (including private insurance) and on the medicines that were actually taken [16].

The data collection period for GEDA 2019/2020-EHIS overlapped with the COVID-19 pandemic. The results set out here are based on the assumption that the sample showed no systematic bias due to the measures taken to contain the COVID-19 pandemic. Although initial analyses have indeed identified no systematic selection bias between the subsamples from the comparison periods 2019 and 2020, a change in willingness to participate and an impact on the results cannot be completely ruled out. The use of short-time working and the expansion of flexible work from home may, for example, have made it easier (or more difficult) to reach certain population groups by telephone.

The analyses set out here are based on questions from the EHIS questionnaire, which was integrated into the GEDA study. The joint query on the occupational groups of psychiatric, psychotherapeutic and psychological treatment providers, as specified by the EHIS, means that it is impossible to differentiate between their respective specific utilisation. This makes it difficult to compare results with those from other data sources and, for example, masks educational differences. One advantage of this method, however, is that data on the utilisation of specialised care services for mental health complaints and disorders are collected as a whole; these data can then be compared with the frequency of these complaints in the population so as to identify discrepancies in care provision and gaps in utilisation.

4.7 Conclusion

This article describes the utilisation of various outpatient services using current representative population-based data. The vast majority of the population utilises outpatient health care services at least once a year.

Only a more differentiated view calling for in-depth analyses reveals that in part the utilisation and its development over time has varied greatly in recent years for different age and population groups. Different utilisation rates among different population groups can be attributed to various causes: in addition to particular medical needs, this includes patient preferences, such as for visiting a GP or a specialist, the availability of care, information about available health services, and access barriers. When comparing the utilisation of specialist services in general to psychiatric/psychotherapeutic utilisation, a deviating educational gradient is noticeable, especially among men. This may indicate barriers to care, varying in terms of specialist groups and the health conditions in question. Early detection and treatment of colorectal cancer are among the measures that have been shown to reduce mortality at the population level. In order to break down existing barriers to utilisation, the specific needs of those eligible, but also their personal attitudes and beliefs, should be given greater consideration. If these services are to become more accessible, research is needed into possible barriers to utilisation, especially in the case of younger people. In principle, qualitative research designs could be used to study non-utilisation of outpatient health services.

Overall, the data from GEDA 2019/2020-EHIS are an important source of information for health services research. Together with data from service providers and structural data on health care provision, they provide a basis with which to undertake comprehensive descriptions of health care provision in Germany. European comparisons can currently only be made to a limited extent, but this will change in the future when all European data from this wave of the EHIS wave become available.

Corresponding author
Dr Franziska Prütz
Robert Koch Institute
Department of Epidemiology and Health Monitoring
General-Pape-Str. 62–66
12101 Berlin, Germany
E-mail: PruetzF@rki.de

Please cite this publication as
Prütz F, Rommel A, Thom J, Du Y, Sarganas G et al. (2021) Utilisation of outpatient medical services in Germany – Results from GEDA 2019/2020-EHIS. Journal of Health Monitoring 6(3): 45–65. DOI 10.25646/8555

The German version of the article is available at: www.rki.de/journalhealthmonitoring

Data protection and ethics

GEDA 2019/2020-EHIS is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The Ethics Committee of the Charité – Universitätsmedizin Berlin assessed the ethics of the study and approved the implementation of the study (application number EA2/070/19).

Participation in the study was voluntary. The participants were informed about the aims and contents of the study and about data protection. Informed consent was obtained verbally.

Funding

GEDA 2019/2020-EHIS was funded by the Robert Koch Institute and the German Federal Ministry of Health.

Conflicts of interest

The authors declared no conflicts of interest.

Acknowledgment

The authors would like to thank Stefan Damerow, Jennifer Allen and Johannes Lemcke from the Department of Epidemiology and Health Monitoring at the Robert Koch Institute for providing text modules describing the GEDA 2019/2020-EHIS study as well as on the limitations that may result from the fact that the GEDA survey period also included the initial phase of the COVID-19 pandemic.

References

1. Robert Koch-Institut (Ed) (2015) Gesundheit in Deutschland. Gesundheitsberichterstattung des Bundes. Gemeinsam getragen von RKI und Destatis. RKI, Berlin
2. Prütz F, Rommel A (2017) Utilization of outpatient medical care in Germany. Journal of Health Monitoring 2(4):82–88. https://edoc.rki.de/handle/176904/2916 (As at 25.06.2021)
3. Sarganas G, Knopf H, Grams D et al. (2016) Trends in Antihypertensive Medication Use and Blood Pressure Control Among Adults With Hypertension in Germany. Am J Hypertens 29(1):104–113
4. Neuhauser HK, Adler C, Rosario AS et al. (2015) Hypertension prevalence, awareness, treatment and control in Germany 1998 and 2008–11. J Hum Hypertens 29(4):247–253
5. Heidemann C, Du Y, Paprott R et al. (2016) Temporal changes in the prevalence of diagnosed diabetes, undiagnosed diabetes and prediabetes: findings from the German Health Interview and Examination Surveys in 1997–1999 and 2008–2011. Diabet Med 33(10):1406–1414
6. Knopf H, Prütz F, Du Y (2017)) Use of medicines by adults in Germany. Journal of Health Monitoring 2(4):103–109. https://edoc.rki.de/handle/176904/2919 (As at 25.06.2021)
7. Gemeinsamer Bundesausschuss (2020) Richtlinie des Gemeinsamen Bundesausschusses für organisierte Krebsfrüherkennungsprogramme in der Version vom 18.06.2020 (Richtlinie für organisierte Krebsfrüherkennungsprogramme – oKFE-RL). https://www.g-ba.de/downloads/62-492-2237/oKFE-RL-2020-06-18-iK-2020-08-28.pdf (As at 12.03.2021)
8. Zentralinstitut für die kassenärztliche Versorgung in Deutschland (2020) Teilnahme an gesetzlichen Früherkennungsuntersuchungen (fäkaler okkulter Bluttest (FOBT), Koloskopie) und an Beratungen zur Prävention von Darmkrebs. http://www.gbe-bund.de (As at 19.02.2021)
9. Starker A, Buttmann-Schweiger N, Krause L et al. (2018) Krebsfrüherkennungsuntersuchungen in Deutschland: Angebot und Inanspruchnahme. Bundesgesundheitsbl 61(12):1491–1499
10. Andersen RM (1995) Revisiting the behavioral model and access to medical care: does it matter? J Health Soc Behav 36(1):1–10
11. Babitsch B, Gohl D, von Lengerke T (2012) Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998–2011. Psychosoc Med 9:Doc11
12. Sachverständigenrat für die Konzertierte Aktion im Gesundheitswesen (2001) Gutachten 2000/2001 des Sachverständigenrates für die Konzertierte Aktion im Gesundheitswesen. Bedarfsgerechtigkeit und Wirtschaftlichkeit. Band I: Zielbildung, Prävention, Nutzerorientierung und Partizipation, Band II: Qualitätsentwicklung in Medizin und Pflege, Band III: Über-, Unter- und Fehlversorgung. Bundestagsdrucksache 14/5660, 14/5661, 14/6871
13. Rommel A, Bretschneider J, Kroll LE et al. (2017) The utilization of psychiatric and psychotherapeutic services in Germany – individual determinants and regional differences. Journal of Health Monitoring 2(4):3–22. https://edoc.rki.de/handle/176904/2911.2 (As at 25.06.2021)
14. Robert Koch-Institut (Ed) (2009) DEGS – Studie zur Gesundheit Erwachsener in Deutschland. Projektbeschreibung. Beiträge zur Gesundheitsberichterstattung des Bundes. RKI, Berlin

15. Schubert I, Köster I, Küpper-Nybelen J et al. (2008) Versorgungsforschung mit GKV-Routinedaten. Nutzungsmoglichkeiten versichertenbezogener Krankenkassendaten für Fragestellungen der Versorgungsforschung. Bundesgesundheitsbl 51(10):1095–1105
16. Ohlmeier C, Frick J, Prütz F et al. (2014) Nutzungsmöglichkeiten von Routinedaten der Gesetzlichen Krankenversicherung in der Gesundheitsberichterstattung des Bundes. Bundesgesundheitsbl 57(4):464–472
17. Kurth BM, Lange C, Kamtsiuris P et al. (2009) Gesundheitsmonitoring am Robert Koch-Institut. Sachstand und Perspektiven. Bundesgesundheitsbl 52(5):557–570
18. Lange C, Jentsch F, Allen J et al. (2015) Data Resource Profile: German Health Update (GEDA) – the health interview survey for adults in Germany. Int J Epidemiol 44(2):442–450
19. Lange C, Finger JD, Allen J et al. (2017) Implementation of the European health interview survey (EHIS) into the German health update (GEDA). Arch Public Health 75:40
20. European Commission, Eurostat (2018) European Health Interview Survey (EHIS wave 3). Methodological manual. European Commission, Luxembourg
21. von der Heyde C (2013) Das ADM-Stichprobensystem für Telefonbefragungen. https://www.gessgroup.de/wp-content/uploads/2016/09/Beschreibung-ADM-Telefonstichproben_DE-2013.pdf (As at 25.06.2021)
22. American Association for Public Opinion Research (AAPOR) (2016) Standard definitions – final disposition codes of case codes and outcome rates for surveys. AAPOR, Deerfield
23. Allen J, Born S, Damerow S et al. (2021) German Health Update (GEDA 2019/2020-EHIS) – Background and methodology. Journal of Health Monitoring 6(3): 66–79. https://www.rki.de/johm-en-2021 (As at 15.09.2021)
24. UNESCO Institute for Statistics (2012) International Standard Classification of Education ISCED 2011. http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf (As at 15.03.2021)
25. Research Data Centres of the Federal Statistical Office and Statistical Offices of the Länder (2017) Microcensus 2017. DOI: 10.21242/12211.2017.00.00.1.1.1, own calculation
26. Rattay P, Butschalowsky H, Rommel A et al. (2013) Inanspruchnahme der ambulanten und stationären medizinischen Versorgung in Deutschland. Bundesgesundheitsbl 56(5):832–844
27. Damerow S, Rommel A, Prütz F et al. (2020) Developments in the health situation in Germany during the initial stage of the COVID-19 pandemic for selected indicators of GEDA 2019/2020-EHIS. Journal of Health Monitoring 5(4):3–20. https://edoc.rki.de/handle/176904/7550.2 (As at 25.06.2021)
28. Lampert T, Prütz F, Rommel A et al. (2018) Social differences in the utilization of medical services by children and adolescents in Germany. Results of the cross-sectional KiGGS Wave 2 study. Journal of Health Monitoring 3(4):35–51. https://edoc.rki.de/handle/176904/5947 (As at 25.06.2021)
29. Hoebel J, Rattay P, Prütz F et al. (2016) Socioeconomic Status and Use of Outpatient Medical Care: The Case of Germany. PLoS One 11(5):e0155982
30. Klein J, von dem Knesebeck O (2016) Soziale Unterschiede in der ambulanten und stationären Versorgung. Bundesgesundheitsbl 59(2):238–244
31. Kürschner N, Weidmann C, Müters S (2011) Wer wählt den Hausarzt zum „Gatekeeper"? Bundesgesundheitsbl 54(2):221–227
32. Eurostat Statistics Explained (2020) Healthcare activities statistics – consultations. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Healthcare_activities_statistics_-_consultations#Consultations_of_doctors (As at 25.06.2021)
33. Grobe TG, Steinmann S, Szecsenyi J (2020) BARMER Arztreport 2020. Psychotherapie – veränderter Zugang, verbesserte Versorgung? Schriftenreihe zur Gesundheitsanalyse. BARMER, Berlin
34. Jacobi F, Höfler M, Strehle J et al. (2014) Psychische Störungen in der Allgemeinbevölkerung: Studie zur Gesundheit Erwachsener in Deutschland und ihr Zusatzmodul Psychische Gesundheit (DEGS1-MH). Nervenarzt 85(1):77–87
35. Jacobi F, Höfler M, Strehle J et al. (2016) Erratum zu: Psychische Störungen in der Allgemeinbevölkerung. Studie zur Gesundheit Erwachsener in Deutschland und ihr Zusatzmodul „Psychische Gesundheit" (DEGS1-MH). Nervenarzt 87:88–90
36. Gaebel W, Kowitz S, Fritze J et al. (2013) Use of health care services by people with mental illness: secondary data from three statutory health insurers and the German Statutory Pension Insurance Scheme. Dtsch Arztebl Int 110(47):799–808

37. Groschwitz RC, Fegert JM, Plener PL (2016) Psychiatrische und psychotherapeutische Versorgung in Deutschland. Psychotherapeut 62(1):12–17

38. Walendzik A, Rabe-Menssen C, Lux G et al. (2014) Zur Versorgungslage im Bereich der ambulanten Psychotherapie – Ergebnisse einer Erhebung unter den Mitgliedern der Deutschen Psychotherapeuten Vereinigung (DPtV). Gesundheitswesen 76(3):135–146

39. Steffen A, Thom J, Jacobi F et al. (2020) Trends in prevalence of depression in Germany between 2009 and 2017 based on nationwide ambulatory claims data. J Affect Disord 271:239–247

40. Kruse J, Herzog W, Hoffmann M et al. (2012) Zwischenbericht zum Gutachten „Zur ambulanten psychosomatischen/psychotherapeutischen Versorgung in der kassenärztlichen Versorgung in Deutschland – Formen der Versorgung und ihre Effizienz". https://www.kbv.de/media/sp/Gutachten_Psychosomatik_Zwischenbericht.pdf (As at 22.06.2021)

41. Keil J, Brendler V, Sachse C et al. (2020) Geschlechterspezifische Inanspruchnahme von Gesundheitsleistungen in einer urbanen Erwachsenenpopulation. Gesundheitswesen 82(3):e17–e23

42. Mauz E, Jacobi F (2008) Psychische Störungen und soziale Ungleichheit im Geburtskohortenvergleich. Psychiatr Prax 35(07):343–352

43. Körner M, Maschke BA, Janssen C (2014) Social determinants of the utilization of psychotherapeutic care in Germany. In: Janssen C, Swart E, von Lengerke T (Eds) Health care utilization in Germany: theory, methodology, and results. Springer, New York, P. 279–292

44. Epping J, Muschik D, Geyer S (2017) Social inequalities in the utilization of outpatient psychotherapy: analyses of registry data from German statutory health insurance. Int J Equity Health 16(1):147

45. Chen C, Laecke E, Stock C et al. (2017) Colonoscopy and sigmoidoscopy use among older adults in different countries: a systematic review. Prev Med 103:33–42

46. Stock C, Ihle P, Sieg A et al. (2013) Adverse events requiring hospitalization within 30 days after outpatient screening and nonscreening colonoscopies. Gastrointest Endosc 77(3):419–429

47. Klabunde C, Blom J, Bulliard JL et al. (2015) Participation rates for organized colorectal cancer screening programmes: An international comparison. J Med Screen 22(3):119–126

48. Eurostat Statistics Explained (2020) Healthcare activities statistics – preventive services. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Healthcare_activities_statistics_-_preventive_services#Screening_of_cardiovascular_diseases (As at 25.06.2021)

49. Statistisches Amt der Europäischen Kommission (2021) Eurostat database health. http://ec.europa.eu/eurostat/data/database (As at 24.06.2021)

50. Klug SJ, Taylor KJ, Scheidemann-Wesp U et al. (2010) Participation in cervical cancer screening in Germany. Prev Med 5(51):431–432

51. Gemeinsamer Bundesausschuss (2018) Richtlinie des Gemeinsamen Bundesausschusses über die Gesundheitsuntersuchungen zur Früherkennung von Krankheiten (Gesundheitsuntersuchungs-Richtlinie). https://www.g-ba.de/downloads/62-492-2383/GU-RL_2020-11-20_iK-2021-02-12.pdf (As at 12.03.2021)

52. Zentralinstitut für die kassenärztliche Versorgung in Deutschland (2020) Teilnahme am gesetzlichen Gesundheits-Check-up. www.gbe-bund.de (As at 12.03.2021)

53. Diederichs C, Neuhauser H (2019) The frequency and determinants of blood pressure measurement by a health professional in Germany: A cross-sectional study. Medicine (Baltimore) 98(16):e15093

54. Sarganas G, Neuhauser HK (2016) The persisting gender gap in hypertension management and control in Germany: 1998 and 2008–2011. Hypertens Res 39(6):457–466

55. Schweizerische Eidgenossenschaft, Bundesamt für Statistik (no date) Fachbereich 14 – Gesundheit. Gesundheitssystem und Präventivmedizin. http://www.portal-stat.admin.ch/sgb2017/files/de/02d.xml (As at 25.06.2021)

56. Knopf H, Grams D (2013) Arzneimittelanwendung von Erwachsenen in Deutschland: Ergebnisse der Studie zur Gesundheit Erwachsener in Deutschland (DEGS1). Bundesgesundheitsbl 56(5/6):868–877

57. Eurostat Statistics Explained (2020) Medicine use statistics. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Self-reported_use_of_prescribed_medicines_by_age,_2014_(%25).png (As at 25.06.2021)

58. Hessel A, Gunzelmann T, Geyer M et al. (2000) Inanspruchnahme medizinischer Leistungen und Medikamenteneinnahme bei über 60jährigen in Deutschland – gesundheitliche, sozialstrukturelle, sozio-demographische und subjektive Faktoren. Z Gerontol Geriatr 33(4):289–299

59. Bhandari A, Wagner T (2006) Self-reported utilization of health care services: improving measurement and accuracy. Med Care Res Rev 63(2):217–235

60. Häder M (2010) Erhebungsmethoden. In: Häder M (Ed) Empirische Sozialforschung – Eine Einführung. VS Verlag für Sozialwissenschaften, Wiesbaden, P. 187–337

61. Groves RM, Peytcheva E (2008) The Impact of Nonresponse Rates on Nonresponse Bias: A Meta-Analysis. Public Opinion Quarterly 72(2):167–189

Annex Table 1
Utilisation of outpatient care services by gender, age and education level
Source: GEDA 2019/2020-EHIS

	Use of general practitioner services in the last twelve months (n=11,945 women, n=10,675 men)		Use of specialist services in the last twelve months (n=11,925 women, n=10,663 men)		Use of psychiatric/ psychotherapeutic services in the last twelve months (n=11,953 women, n=10,682 men)		Blood pressure measurement in the last twelve months (n=11,873 women, n=10,597 men)		Blood cholesterol measurement in the last twelve months (n=11,622 women, n=10,341 men)		Blood sugar measurement in the last twelve months (n=11,383 women, n=10,168 men)		Utilisation of medically prescribed drugs in the last two weeks (n=11,958 women, n=10,686 men)	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Total														
Women	84.2	(83.2–85.2)	67.8	(66.5–69.1)	12.7	(11.8–13.7)	81.0	(79.9–82.1)	64.7	(63.3–66.0)	62.3	(60.9–63.7)	59.2	(57.9–60.6)
Men	79.5	(78.2–80.7)	53.3	(51.8–54.7)	8.9	(8.0–9.8)	70.7	(69.3–72.0)	59.4	(57.9–60.8)	57.4	(55.9–58.9)	50.6	(49.1–52.0)
Life stage (age group)														
Women														
18–29 years	79.6	(76.1–82.7)	62.8	(58.6–66.9)	19.2	(15.7–23.1)	72.9	(69.0–76.5)	46.2	(41.8–50.7)	42.7	(38.3–47.2)	36.9	(32.8–41.2)
30–44 years	80.6	(78.0–82.9)	68.1	(64.9–71.1)	15.2	(13.0–17.6)	76.2	(73.5–78.8)	50.3	(47.0–53.5)	48.1	(44.8–51.3)	38.0	(35.0–41.1)
45–64 years	85.3	(83.8–86.7)	72.3	(70.3–74.1)	14.5	(13.0–16.1)	81.3	(79.6–83.0)	68.2	(66.3–70.1)	65.8	(63.9–67.8)	62.2	(60.2–64.1)
≥65 years	88.2	(86.5–89.6)	64.9	(62.5–67.3)	5.3	(4.4–6.5)	88.4	(86.9–89.8)	80.5	(78.6–82.2)	78.4	(76.4–80.3)	83.6	(81.8–85.1)
Men														
18–29 years	76.4	(73.1–79.4)	42.6	(39.0–46.4)	8.9	(7.0–11.6)	50.6	(46.8–54.4)	33.1	(29.6–36.8)	31.5	(28.0–35.3)	20.7	(17.8–23.9)
30–44 years	72.0	(68.9–74.9)	43.4	(40.2–46.6)	9.5	(7.7–11.7)	59.6	(56.3–62.8)	44.5	(41.2–47.9)	42.5	(39.2–45.9)	30.8	(27.8–34.0)
45–64 years	80.4	(78.5–82.1)	56.2	(53.9–58.5)	11.6	(10.0–13.3)	77.1	(75.2–79.0)	67.2	(64.9–69.4)	64.7	(62.4–67.0)	57.1	(54.7–59.3)
≥65 years	87.9	(85.9–89.7)	66.6	(63.9–69.1)	3.8	(3.0–4.9)	86.5	(84.4–88.3)	80.3	(77.9–82.5)	78.6	(76.1–80.9)	83.0	(80.8–85.0)
Education group														
Women														
Low	86.3	(83.2–88.9)	58.2	(54.2–62.2)	14.8	(12.1–17.9)	83.0	(79.7–85.8)	70.3	(66.4–74.0)	66.5	(62.5–70.3)	69.3	(65.4–72.9)
Medium	84.6	(83.3–85.9)	69.1	(67.5–70.7)	11.9	(10.7–13.2)	81.2	(79.7–82.5)	65.1	(63.4–66.8)	62.6	(60.9–64.3)	58.9	(57.2–60.6)
High	80.9	(79.3–82.4)	74.2	(72.4–75.8)	13.1	(11.7–14.5)	79.0	(77.4–80.5)	57.8	(55.9–59.7)	57.3	(55.3–59.2)	50.2	(48.3–52.1)
Men														
Low	82.6	(78.1–86.4)	49.9	(44.6–55.3)	13.0	(9.6–17.2)	68.5	(63.3–73.3)	57.0	(51.4–62.5)	52.0	(46.4–57.5)	54.0	(48.7–59.3)
Medium	78.2	(77.6–81.0)	51.9	(49.8–53.9)	9.0	(7.9–10.3)	71.6	(69.6–73.4)	59.7	(57.6–61.8)	58.2	(56.0–60.2)	50.9	(48.9–53.0)
High	78.2	(76.8–79.6)	57.4	(55.8–59.0)	6.7	(5.9–7.5)	70.1	(68.5–71.6)	59.9	(58.3–61.5)	58.5	(56.8–60.1)	48.6	(47.0–50.2)

CI=Confidence interval

Annex Table 2
Utilisation of stool tests and colonoscopies by gender, age and education level
Source: GEDA 2019/2020-EHIS

	Stool test within the last two years (n=3,058 women, n=2,449 men)		Colonoscopy within the last ten years (n=4,329 women, n=4,079 men)	
	%	(95% CI)	%	(95% CI)
Total				
Women	42.5	(40.7–44.3)	58.7	(56.9–60.5)
Men	41.5	(39.5–43.5)	53.4	(51.5–55.2)
Life stage (age group)				
Women				
50–54 years	–	–	–	–
55–59 years	49.3	(45.5–53.0)	49.5	(45.8–53.2)
60–64 years	48.2	(44.2–52.3)	58.6	(54.6–62.5)
≥65 years	38.6	(36.3–40.9)	61.8	(59.4–64.1)
Men				
50–54 years	–	–	–	–
55–59 years	38.1	(33.9–42.6)	42.9	(38.6–47.3)
60–64 years	44.2	(40.0–48.5)	58.2	(53.8–62.4)
≥65 years	41.7	(39.1–44.3)	63.9	(61.2–66.6)
Education group				
Women				
Low	38.2	(33.6–43.0)	57.9	(53.1–62.6)
Medium	43.6	(41.6–45.7)	58.8	(56.8–60.8)
High	45.9	(43.7–48.1)	59.5	(57.3–61.7)
Men				
Low	35.8	(27.9–44.7)	49.5	(41.4–57.6)
Medium	42.0	(39.2–44.9)	51.9	(49.2–54.5)
High	42.1	(40.2–44.1)	57.1	(55.2–58.9)

CI=Confidence interval

Imprint

Journal of Health Monitoring

Publisher
Robert Koch Institute
Nordufer 20
13353 Berlin, Germany

Editors
Johanna Gutsche, Dr Birte Hintzpeter, Dr Franziska Prütz,
Dr Martina Rabenberg, Dr Alexander Rommel, Dr Livia Ryl,
Dr Anke-Christine Saß, Stefanie Seeling, Dr Thomas Ziese
Robert Koch Institute
Department of Epidemiology and Health Monitoring
Unit: Health Reporting
General-Pape-Str. 62–66
12101 Berlin, Germany
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Kerstin Möllerke, Alexander Krönke

Translation
Simon Phillips/Tim Jack

ISSN 2511-2708

Note
External contributions do not necessarily reflect the opinions of the Robert Koch Institute.

The Robert Koch Institute is a Federal Institute within the portfolio of the German Federal Ministry of Health

Journal of Health Monitoring · 2021 6(3)
DOI 10.25646/8559
Robert Koch Institute, Berlin

Jennifer Allen, Sabine Born, Stefan Damerow, Ronny Kuhnert, Johannes Lemcke, Anja Müller, Tim Weihrauch, Matthias Wetzstein

Robert Koch Institute, Berlin
Department of Epidemiology and Health Monitoring

Submitted: 16.04.2021
Accepted: 02.08.2021
Published: 15.09.2021

German Health Update (GEDA 2019/2020-EHIS) – Background and methodology

Abstract

Between April 2019 and September 2020, 23,001 people aged 15 or over responded to questions about their health and living conditions for the German Health Update (GEDA 2019/2020-EHIS). The results are representative of the German resident population aged 15 or above. The response rate was 21.6%. The study used a questionnaire based on the third wave of the European Health Interview Survey (EHIS), which was carried out in all EU member states. EHIS consists of four modules on health status, health care provision, health determinants, and socioeconomic variables. The data are collected in a harmonised manner and therefore have a high degree of international comparability. They constitute an important source of information for European health policy and health reporting and are made available by the Statistical Office of the European Union (Eurostat). They also form the basis of the Federal Health Reporting undertaken in Germany. Data collection began in April 2019, just under a year before the beginning of the SARS-CoV-2 pandemic, and continued into its initial phase, as of March 2020. As such, data from the current GEDA wave can also be used to conduct research into the health impact of the SARS-CoV-2 pandemic.

STUDY METHODOLOGY · HEALTH SURVEY · TELEPHONE INTERVIEW · HEALTH MONITORING · EHIS · RESPONSE

1. Background

The German Health Update (GEDA) is conducted regularly by the Robert Koch Institute (RKI) on behalf of the German Federal Ministry of Health (BMG) and is part of the nationwide health monitoring at the RKI [1, 2]. The nationwide telephone survey GEDA 2019/2020-EHIS, the fifth wave of this study, took place between April 2019 and September 2020. The previous cross-sectional surveys were carried out in 2009, 2010, 2012 and 2014/2015, and each involved over 20,000 respondents [3–6].

The aim of the GEDA study is to provide current information about people's health, the factors that influence their health, and their use of the health care system. The data form an important basis for the Federal Health Reporting (GBE), which provides information about issues relevant to health policy and thus supports policy planning and decision-making processes in Germany. The data are also provided to researchers as a scientific use file.

In its function as national data provider, the RKI also transmits the health data collected in the context of GEDA to the Statistical Office of the European Union (Eurostat). The last wave of the European Health Interview Survey (EHIS) took place in 2019/2020, and was legally binding for all EU member states. The EHIS and its use of statistics are undertaken in line with the European Commission

GEDA 2019/2020-EHIS

Fifth follow-up survey of the German Health Update

Data holder: Robert Koch Institute

Objectives: Provision of reliable information on the health status, health behaviour and health care of the population living in Germany, with the possibility of European comparisons

Study design: Cross-sectional telephone survey

Population: German-speaking population aged 15 and older living in private households that can be reached via landline or mobile phone

Sampling: Random sample of landline and mobile telephone numbers (dual-frame method) from the ADM sampling system (Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V.)

Sample size: 23,001 respondents

Study period: April 2019 to September 2020

GEDA survey waves:
- GEDA 2009
- GEDA 2010
- GEDA 2012
- GEDA 2014/2015-EHIS
- GEDA 2019/2020-EHIS

Further information in German is available at www.geda-studie.de

Regulation (EU) 2018/255 of 19 February 2018 implementing Regulation 1338/2008 of the European Parliament and of the Council on community statistics on public health and health and safety at work [7]. The aim of the EHIS is to regularly provide comparable health data from EU member states and, thus, permit analyses of health trends in Europe. Furthermore, the GEDA 2019/2020-EHIS study is aimed at continuing the time series established by health monitoring in Germany. The sample size enables regionalised and deeply structured correlation analyses to be carried out.

2. Study design

In accordance with the EHIS regulations, the study population comprises people aged 15 or above living in private households, whose usual residence at the time when the data was collected is Germany. This includes both one- and multi-person households that operate independently and provide for their own needs. As such, collective households such as hospitals, care and residential homes, prisons, military barracks, religious institutions, boarding houses or hostels are not included in the survey. 'Usual residence' refers to the place where a person normally lives and views as the centre of their life, irrespective of temporary absences due to recreation, work, medical treatment etc.

The survey used a telephone sample, which was provided by the Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V. (ADM) [8]. It is based on the so-called dual-frame method, in which two selection populations are used: one consisting of mobile phone numbers, and another consisting of landline phone numbers. This sampling method provides (almost) complete coverage of the population in Germany [9]. A method developed by Leslie Kish for the random selection of respondents in multi-person households (the Kish Selection Grid) was used to randomly select prospective respondents [10]. Here, all potential interview partners are given the same selection probability and one person is randomly selected by the computer. This person is identified on the basis of the recorded age and gender.

The interviews began by informing the respondents about the voluntary nature of participation, the survey objectives and data protection; all respondents provided verbal consent to participate. If the target person was unable to conduct the telephone interview, for example due to a cognitive or sensory impairment or due to a long-term absence during the survey, a proxy interview (i.e., another person responds on behalf of the selected person) was refrained from. Some of the topics surveyed in the GEDA study are sensitive and some are highly subjective, so it must be assumed that not all information can be obtained correctly from a proxy respondent.

The data was collected by USUMA GmbH, an external market and social research institute. Staff from the RKI monitored the entire survey process, provided continuous supervision and undertook comprehensive field monitoring (see Chapter 3, Field monitoring).

Questionnaire

The content of GEDA 2019/2020-EHIS was based on the third wave of the EHIS. As EHIS waves 2 and 3 remained largely unchanged, the data they collected can be used to compare European member states over time. The questionnaire comprised the following four modules:

- Background variables on demographic, geographic and socioeconomic characteristics of participants: including sex, age, education, employment status, country of birth, nationality, marital status, household type and income
- Health status: including self-assessed health, chronic illnesses, accidents and injuries, restrictions to everyday life, disease-specific morbidity, physical and sensory functional limitations, pain and mental health
- Health care provision: including the utilisation of different types of health services (hospital stays, doctor visits, prevention), medicine use, preventive measures and unmet health service needs
- Health determinants: including body mass index (height and weight), diet (consumption of fruit and vegetables), smoking behaviour, alcohol consumption and physical activity

The regulations governing the implementation of the EHIS specify the items to be surveyed including their characteristics and the codes to be transmitted to Eurostat. In addition, the wording of the questions and their response categories, as well as the order in which they are asked, was clarified in a methodological manual and made available in the form of a sample questionnaire (in English) [11]. Compliance with the rules and recommendations was essential to ensure harmonised, high-quality health data could be collected throughout the EU. All EU member states were permitted to add questions to the questionnaire. At this point it should be noted that in GEDA 2019/2020-EHIS an adjustment was made regarding the gender query: in addition to the sex assigned at birth (sex at birth), the gender to which the respondents actually feel they belong (gender identity) was also surveyed. The non-binary question about gender identity enabled the respondents to provide a third open answer in addition to 'female' or 'male'. Respondents 15 years and older included 12,101 women and 10,838 men. 62 respondents indicated a different gender identity (n=28) or gave no information at all (n=34). A detailed description of this procedure will be published elsewhere. With the exception of results based on comparisons with population data taken from the Federal Statistical Office 2019/microcensus 2017, all results reported separately for women and men in this article reflect gender identity. The questionnaire is published as a supplement to this issue of the Journal of Health Monitoring. It can be used for research if the source is provided.

GEDA 2019/2020-EHIS is a cross-sectional telephone-based study of the population in Germany in which 23,001 people provided information about their health.

Survey methods

The most recent GEDA wave was conducted as a telephone interview survey using a computer assisted, fully structured interview (i.e. Computer Assisted Telephone Interview, CATI). The questionnaire was implemented with the help of the 'VOXCO Interviewer Suite' software, which offers all the advantages of computer-aided interviews: automated filtering, plausibility checks and defined response areas (range checks). These significantly benefit the quality of the data.

In addition to providing interviewers with a clear graphical interface, the software also offers a complex call management. Telephone number selection, the dialling process and repeated contact attempts are fully automated and undertaken independently of the interviewer.

After programming was completed, the questionnaire routinely underwent several internal quality assurance steps.

The data are used for Federal Health Reporting in Germany. The Statistical Office of the European Union (Eurostat) uses them to compile official European statistics.

First, the wording was compared with the programming template in order to detect transmission errors during programming. The questions, the answer categories, and the bridging texts were checked to ensure that they corresponded word for word with the programming template. The functionality of the questionnaire was then examined with a focus on the following areas:

- Branching logic (automatically skipping inapplicable questions),
- Plausibility checks (e.g. error messages if implausible body mass indexes were entered in order to avoid incorrect entries by the interviewer on height and weight),
- Range checks (e.g. error messages if the figures entered were too high or low, in order to avoid incorrect entries),
- Coding of the response categories (mainly supplied by Eurostat).

During testing, particular emphasis was placed on the complex call and callback management built into the questionnaire. Since not every call immediately leads to an interview, all possible call results need to be accounted for in advance so that they can be allocated to disposition codes using the software. Detailed documentation of call results is of crucial importance for the management of callback rules, but it also enables response rates to be calculated. In order to prevent interviewers from inputting incorrect codes, the callback management needs to be effective and easy to use.

In addition to providing effective and detailed documentation of call results, the callback management also fulfils other elementary functions: before the actual interview (survey phase) could take place, interviewees had to be identified and persuaded to participate in the study; this was undertaken during the contact initiation phase. Whereas the survey phase was subject to strict standardisation rules, the callback management system functioned as a guideline for the interviewers during the contact initiation phase so that they could adapt in a tailored and flexible manner to each interviewee. In doing so, the RKI followed the guidelines recommended by the ADM [12]. The extent to which all possible scenarios in the contact initiation phase could be mapped correctly and efficiently via the call and callback management was determined in a pretest (see Chapter 3, Pretesting).

3. Survey implementation

Training approach

An external market and social research institute (USUMA GmbH) was commissioned with carrying out the data collection for GEDA 2019/2020-EHIS. The RKI already has a long-term partnership for the joint implementation of telephone surveys with this institute (GEDA 2012, various ad hoc studies). During data collection, the RKI's training concept was regularly revised and adapted. The following theoretical units were taught during training sessions (see [13]):

- Information about the client, background and objective of the study,
- Structure, content and special features of the questionnaire,
- Correct technical handling of the CATI software (such as handling disposition codes, navigating the questionnaire),

- Complete, informative, and data protection-compliant documentation of the identification of interviewees and their consent to participate,
- Procedures during the contact phase (interviewing techniques, appropriate conduct),
- Standardised interview management and dealing with information about poor quality interviews,
- Handling difficult situations appropriately (such as digression, pauses in conversation, sensitive questions).

Practical exercises constituted an integral aspect of the training approach and were carried out once the theoretical units had been completed. Among other issues, the interviewers were able to familiarise themselves with the software and practise using disposition codes to code call results with the help of selected example scenarios. Mutual training interviews were extremely valuable, as they enabled the interviewers to adopt the role of interviewees. This provided the interviewers with a feel for the questionnaire's length, composition and complexity, and enabled them to hone their skills. Moreover, it also helped them to train for difficult calls and thus refine their interviewing techniques.

In addition, a leaflet was made available on the interviewers' desks summarising all relevant information about the study, key training elements, contact details and how to find more information.

During fieldwork, further interviewers had to be trained to replace interviewers who left the study. As of March 2020, all training courses were carried out online. A total of 216 interviewers were trained during 35 training courses.

Pretesting

As mentioned in Chapter 2 (Survey methods), the functionality of the questionnaire was tested once programming had been completed. However, some areas of the questionnaire could only be analysed during pretests as they required interviewees. A standard pretest was carried out with a random sample of around 200 interviewees before the survey began. The pretest examined the following aspects and quality criteria (see [14]):

- Comprehensibility: the clarity of the questions was examined in order to ensure that the content and data were being queried and collected as intended (validity)
- Order and logic behind the questions: the order of the question sets was studied to ensure that it was not unconsciously influencing interviewee responses (reliability)
- Filtering: the question sequences were reviewed to make sure that the filters had been programmed correctly (reliability)
- Questionnaire construction and sequencing: the coherence of the questionnaire was examined to avoid unnecessary questions and duplicates (homogeneity and selectivity)
- Call and callback management functionality
- Questionnaire duration: time performance of the overall questionnaire and the question sets

The quality assurance team used the pretest data set to review these aspects and to examine the frequency, distribution of missing values and the length of time required for individual question sets. Feedback was also obtained from the interviewers and supervisors and it was included in the evaluation of the questionnaire.

Fieldwork

A total of 23,001 interviews were undertaken between April 2019 and the beginning of September 2020. For some regions, the number of interviews was increased to enable the respective federal states to use the data for representative analyses of their own population; in the current GEDA wave, this was done in the case of Berlin and Saarland. Telephone interviews were conducted between Monday and Friday (from 8:30 a.m. to 9:00 p.m.) and on Saturday (from 10:00 a.m. to 3:00 p.m.). They took place in a telephone studio under the supervision of experienced supervisors, and, from mid-March 2020, in line with the measures put in place to contain the SARS-CoV-2 pandemic. Initial contact with potential interviewees usually took place between 2:30 p.m. and 9:00 p.m. On average, 4.3 calls were necessary to complete an interview. The adjusted interview duration was around 40 minutes. There were a total of 216 interviewers – 114 women and 102 men – aged between 19 and 84 years (mean age 53). Diversity was ensured among the interviewers to minimise interviewer effects, i.e. their influence on the responses provided. On average, 1,278 (minimum: 394, maximum: 1,841) people took part in the survey each month.

Field monitoring

A key aspect of conducting scientific telephone surveys is compliance with a standardised measurement situation (i.e. the interview). To meet this requirement, continuous field monitoring was undertaken and specific criteria were used to continuously monitor quantitative and qualitative aspects of data collection; this enabled specific measures to be derived for field monitoring. The field monitoring undertaken for GEDA 2019/2020-EHIS was based on a standardised concept [15, 16]. Quantitative field monitoring involved observing and evaluating various process data (number of call attempts, interviews, refusals, appointments, average interview duration, etc.). This made it possible to continuously assess the interviewers' methods and effectiveness and to identify any irregularities in good time so that targeted follow-up training could be offered as early as possible. Qualitative field monitoring was carried out in parallel in the form of supervision. Supervision was conducted by staff from the external market and social research institute and the RKI. During the fieldwork, feedback rounds were held at regular intervals with the interviewers and separate meetings among the supervisors took place where experiences were exchanged. In addition, study-specific information was recorded in a field diary. The supervisors were entrusted with the following tasks:

- Allocation of seating (new interviewers were placed next to experienced interviewers, for example, so that they could learn interview techniques),
- Answering acute questions, such as in dealing with the software or with difficult situations in establishing contacts,
- Quality assurance and contact initiation coaching,
- Quality assurance and coaching of the standardised interview situation.

One of the main objectives of the supervision was to continuously oversee the initial contacts and interviews during the course of data collection and thus to ensure and improve the quality of the work being undertaken. A standardised supervision template (see [16]) was used for this

purpose; it was discussed in detail with the interviewers after supervision had been completed and subsequently was archived. These documents were available to supervisors during the fieldwork and formed the basis for the next supervision, so that evaluations could be made of the interviewers' development over time. If an interviewer had difficulties with contact initiation or (standardised) interviewing, they were provided with follow-up training and, if necessary, additional training in interview techniques. The institutes regularly shared the results gained from these qualitative and quantitative methods. Overall, 1,616 supervisions were carried out during the fieldwork.

4. Response

A total of 23,001 complete interviews were conducted (12,620 landline, 10,381 mobile). The response rate (landline and mobile phone numbers) was determined using the standards of the American Association for Public Opinion Research (AAPOR), whereby the most information-rich result was used instead of merely the last in a particular call sequence [17]. A total of 672,500 phone numbers from the landline sample and 514,823 numbers from the mobile sample were called. As is usual in telephone surveys, most of the numbers were invalid (e.g. unassigned); these were classified using AAPOR codes 4,300 or 4,310 (landline: 524,737 numbers, mobile: 382,044 numbers) [18].

The AAPOR system uses different methods to differentiate between response rates. In simplified terms, phone numbers are assigned to four basic categories depending on the final result: interviews (codes beginning with 1), refusals/non-respondents (codes beginning with 2), unclear phone numbers (codes beginning with 3), invalid phone numbers (codes beginning with 4). Here the Response Rate 3 is reported. Response Rate 3 estimates what proportion of cases of unknown eligibility is actually eligible. It weights phone numbers with an unclear status by providing an estimate of the 'eligibility rate'; this is calculated as a ratio of refusals/non-respondent calls to invalid numbers. This resulted in a combined response rate (RR3) of 21.6%. The RR3 for the landline sample is 13.8% and 31.0% for the mobile sample. The substantial difference between these rates is mainly due to the much higher proportion of refusals among landline numbers (landline: 8.9%, mobile: 2.7%) and the lower proportion of phone numbers with an unclear status (landline: 3.0%, mobile: 16.9%) in the landline sample.

The need for dual-frame sampling becomes particularly clear when looking at the sample composition differentiated

Table 1
Response by sociodemographic characteristics, broken down into landline and mobile phone numbers
Source: GEDA 2019/2020-EHIS

Characteristic	Landline		Mobile	
	n	%	n	%
Gender (gender identity)				
Female	7,227	57.4	4,874	47.1
Male	5,359	42.6	5,479	52.9
Age group				
15–39 years	1,665	13.2	3,145	30.3
40–59 years	3,852	30.5	3,974	38.3
≥60 years	7,103	56.3	3,262	31.4
Education level (ISCED classification 2011)				
Low education group	946	7.5	673	6.5
Medium education group (No A-Levels)	3,864	30.7	2,701	26.1
Medium education group (A-Levels)	1,567	12.5	1,550	15.0
High education group	6,212	49.3	5,425	52.4

ISCED=International Standard Classification of Education

by landline and mobile phone numbers. Although no substantial differences were identified by education, significant differences were found between mobile and landline numbers by gender and age. The mobile sample contains a much larger proportion of 15- to 39-year-olds (30.3%) than the landline sample (13.2%). In contrast, the landline sample contains a significantly higher proportion of people aged 60 or above (56.3%) than the mobile sample (31.4%). Female participants are also represented much more often in the landline sample (57.4%) than in the mobile sample (47.1%).

5. Data preparation

Data validation

In addition to the field monitoring measures described above, part of the data quality assurance conducted for GEDA 2019/2020-EHIS involved further extensive checks during data collection. Procedures used to prepare, check and cleanse the data were standardised as far as possible. The methods established for data preparation and quality assurance were supplemented by database tools for the administration and documentation of survey instruments and quality assurance measures. The test procedures developed and specified by Eurostat as part of EHIS were also fully integrated [11].

A reporting tool was used for the first time in the GEDA study during the 2019/2020 wave. This enabled all the relevant information for quality assurance to be displayed clearly and made available centrally to the staff involved in the project. The reporting tool was used for quality assurance throughout fieldwork so that errors in the data collection process could be identified and action could be taken immediately. Compliance with EHIS specifications (consistency checks, filters) was also reviewed when the data was being cleansed and prepared. The reporting tool was updated monthly.

Data cleansing and quality assurance specifically involved checking that the correct form of filtering was being implemented, identifying and correcting implausible information (e.g. value ranges, inconsistencies), and generating new variables. The guidelines developed by Eurostat were also followed during this process. This led to the implementation of three different groups of rules: code reviewing and value ranges (value check, VC), filter checks (skip check, SC) and checking the plausibility between different sub-topics (consistency check, CC). In addition, free text coding and income imputation (replacement of missing income information with statistical methods) were also carried out.

Since the study used computer-assisted telephone interviews (CATI), aspects of filtering and plausibility checks could already be incorporated during the construction of the survey instrument. For example, filters were built in during programming to implement the skip checks specified by Eurostat, so that filter violations could largely be ruled out. Value checks were also built into the questionnaires to ensure that values were within plausible ranges, which is why only a few details (e.g. on income and household composition) had to be examined in more detail afterwards and set to missing in some cases.

These types of checks may also require the data to be further reviewed. However, although warnings may highlight certain values as implausible, they may actually be valid. In contrast, error messages may mean that values have to be replaced with valid input.

As part of EHIS, EU member states collect data every six years on the health status, health care provision and health determinants of the population aged 15 and older.

The Indicators Manual provided by Eurostat contained a list of the variables to be generated in order to be able to perform international comparisons, for example with previous EHIS waves or between EU countries. The RKI's Epidemiological Data Centre generated the required variables centrally for the evaluation data set and a detailed data information was created.

Sometimes open answers had to be inputted, which was the case with 'professional qualifications/occupation' and, to a lesser extent, gender identity. The responses on gender identity were evaluated by experts and the responses were assigned the appropriate codes. The responses to the questions about occupation were initially coded using the (national) Classification of Occupations 2010 (KldB10) [19, 20]. This involved computer-supported manual coding using software programmed and developed at the RKI. After the data had been recorded using KldB10 codes, the codes were changed to those used by the International Standard Classification of Occupations 2008 (ISCO 08) [21]. The majority of these codes were automatically converted using a unique conversion key. The remaining codes – approximately 30% – were assigned manually. The maximum number of ISCO-08 codes is four.

Weighting

The weights indicate how many people from the general population are represented by one person in the sample. Weighting typically involves design and adjustment weighting. The design weights are determined by the probability of a particular person being selected for the study (selection probability). People with a lower selection probability represent more people from the population than people with a high probability of selection. As discussed in Chapter 2, the sample was based on a combination of mobile and landline numbers. The resulting design weights are based on a standard calculation method used for the dual-frame design presented here [22]. The calculation was conducted by the market and social research institute commissioned with carrying out the survey.

Adjustment weighting aims to balance out possible differences in willingness to participate in the study. If people from certain population groups are less willing to take part in a study, they will be less represented in the sample than in the actual population. The sample was adjusted to account for potential bias using population data supplied by the Federal Statistical Office (Destatis) and the microcensus 2017. The population was divided into non-overlapping subpopulations (strata) for which the population numbers are known. In the sample, the weights were adjusted in each stratum to ensure that the figures correspond to the external information. In order to do so, the sample was divided by federal state, residential structure [23], age, sex and education (in line with the International Standard Classification of Education, ISCED11 [24]). Information on sex at birth was used so ensure that the sample could be compared with the population projection. Adjustment weighting was carried out iteratively using raking [25]. This procedure was repeated until very little change was noted between the figures. After each adjustment stage, weights that were lower than the 0.5% quantile or greater than the 99.5% quantile were set to the value of the nearest quantile. For evaluations of sub-samples with participants aged 18 or over, an extra weighting factor was applied, which was established using the same procedure. During

GEDA data enable comparative analyses to be conducted at European level.

weighting, it is imperative that all relevant variables have valid values. Missing values were therefore replaced by valid values (most common category in education; imputation of state information and district type).

Characteristic	n	%	Weighted %	Destatis 2019/ Microcensus 2017** %
Sex (biological sex)				
Female	12,111	52.7	51.0	51.0
Male	10,890	47.3	49.0	49.0
Age group				
15–29 years	2,394	10.4	18.9	19.0
30–44 years	3,769	16.4	21.9	21.9
45–64 years	8,981	39.1	34.0	34.0
65–79 years	6,048	26.3	17.4	17.3
≥80 years	1,809	7.9	7.8	7.9
Residential structure of district (BBSR)				
Sparsely populated rural areas	2,554	11.9	14.9	14.9
Rural districts	2,830	13.2	17.1	17.1
Urban districts	8,385	39.1	37.8	38.5
District-free cities	7,664	35.8	30.2	29.4
Education level* (ISCED classification 2011)				
Low education group	1,339	5.9	17.8	17.5
Medium education group (no A-Levels)	6,560	29.0	41.9	42.2
Medium education group (A-Levels)	3,109	13.7	15.1	15.2
High education group	11,637	51.4	25.1	25.2

BBSR=Federal Institute for Research on Building, Urban Affairs and Spatial Development, ISCED=International Standard Classification of Education

* Only participants aged 18 or over are shown, as a large proportion of the population aged 15 to 17 has yet to complete an education level described by ISCED11

** Sex, age and residential structure based on population data from the Federal Statistical Office 2019; ISCED education groups based on the 2017 microcensus

Table 2
Description of the sample by sociodemographic characteristics and total number, unweighted, weighted and compared with population data from the Federal Statistical Office 2019/microcensus 2017
Source: GEDA 2019/2020-EHIS

Overall, the unweighted proportions by age group and sex show a relatively good correlation with the weighted proportions that correspond to official population figures. There are certain differences between respondents under 45 years of age, who are underrepresented in the unweighted sample (Table 2), and respondents between 45 and 79, who are over-represented. Table 2 demonstrates that fewer people in the low education group were prepared to be interviewed; on the other hand, there was a greater willingness to participate among the high education group. This educational bias in the sample was also identified by the GEDA 2012 study [5].

6. Strengths and Limitations

The integration of EHIS into the GEDA 2019/2020-EHIS study makes it possible to compare health data from Germany with relevant data from EU member states and to conduct analyses at the European level. However, it should be noted that survey modes and sample designs vary between countries and this must be taken into account when evaluating results [26].

Trend analyses can be conducted for certain aspects using data from previous GEDA waves (2009, 2010, 2012) as these were also conducted as telephone-based studies. The data from the GEDA 2014/2015-EHIS survey is comparable with the current wave as the questionnaire has remained largely unchanged. However, the sample design was changed from a register sample to a telephone sample, which is why conclusions about trends are only possible with restrictions. In addition, the survey mode altered from a self-administered questionnaire (online, paper) to a computer-assisted

telephone interview (CATI). Results indicating breaks in health-indicator trends in Germany and, therefore, need to be treated with caution. However, a methodological study found that study mode had very little impact on the prevalence of some health indicators, although it was shown to affect others more strongly [27]. As data collection was undertaken between April 2019 and September 2020, EHIS partly took place during the initial phase of the SARS-CoV-2 pandemic [28]. In addition to aspects of COVID-19, the measures put in place to contain the pandemic had an impact on many other aspects of population health. These measures may also have influenced people's willingness to participate in the study. The expansion of flexible working from home and the increased use of short-time work could mean that certain population groups were easier or more difficult to reach by telephone. Such impacts have already been observed in the literature. A study from the United States, for example, found that willingness to participate in the 2020 census significantly reduced in line with increasing infection rates (postal recruitment) [29]. When analysing the data from GEDA 2019/2020-EHIS, the potential impact of the pandemic on health and possible changes in willingness to participate need to be considered. This can be done using sensitivity analyses and, if necessary, these impacts can be accounted for, for example, by correcting weighting factors. Despite these limitations, GEDA 2019/2020-EHIS provides unique data for research into the health impact of the SARS-CoV-2 pandemic (see [30] and the Fact sheet Utilisation of outpatient medical services by people with diagnosed diabetes during the COVID-19 pandemic in Germany in issue 2/2021 of the Journal of Health Monitoring). EHIS is representative of the population in Germany and uses consistent survey instruments to depict temporal developments. No other survey was found that does this while also enabling direct comparisons to be made about population health around a year before the outbreak of SARS-CoV-2 pandemic with the period that immediately followed (March 2020). It is important to note that the selection framework used for the ADM sample is an established research tool. It enables high-quality random samples to be drawn from the general population. In addition, the use of a telephone interview means that a fully standardised survey mode was selected that can be used efficiently and relatively quickly. Potential interviewer effects (cluster effects) are less pronounced with telephone interviews than with face-to-face surveys [31]. At the same time, telephone interviews provide the possibility of conducting efficient quality assurance by continuously supervising the interviewers [32]. However, these surveys also have limitations compared with other survey modes. Like all interviewer-based surveys, telephone interviews are prone to socially desirable responses. In the case of potentially sensitive questions, this can lead to underestimates of 'true' prevalences [32]. Finally, reported response rates for telephone surveys are generally lower than for face-to-face interviews and this can increase the risk of non-response bias, although a low response rate need not automatically lead to biased results [33].

GEDA is the largest population-based health survey of adults in Germany and involves more than 20,000 respondents per wave.

Corresponding author
Jennifer Allen
Robert Koch Institute
Department of Epidemiology and Health Monitoring
General-Pape-Str. 62–66
12101 Berlin, Germany
E-mail: AllenJ@rki.de

Please cite this publication as
Allen J, Born S, Damerow S, Kuhnert R, Lemcke J et al. (2021) German Health Update (GEDA 2019/2020-EHIS) – Background and methodology. Journal of Health Monitoring 6(3): 66–79. DOI 10.25646/8559

The German version of the article is available at: www.rki.de/journalhealthmonitoring

Data protection and ethics

GEDA 2019/2020-EHIS is subject to strict compliance with the data protection provisions set out in the EU General Data Protection Regulation (GDPR) and the Federal Data Protection Act (BDSG). The Ethics Committee of the Charité – Universitätsmedizin Berlin assessed the ethics of the study and approved the implementation of the study (application number EA2/070/19).

Participation in the study was voluntary. The participants were informed about the aims and contents of the study and about data protection. Informed consent was obtained verbally.

Funding

GEDA 2019/2020-EHIS was funded by the Robert Koch Institute and the German Federal Ministry of Health.

Conflicts of interest

The authors declared no conflicts of interest.

Acknowledgment

Special thanks are due to all those involved who made the GEDA study possible through their committed cooperation: the interviewers from USUMA GmbH, the colleagues of the GEDA team at the RKI. We would also like to thank all participants.

References

1. Kurth BM, Lange C, Kamtsiuris P et al. (2009) Gesundheitsmonitoring am Robert Koch-Institut. Sachstand und Perspektiven. Bundesgesundheitsbl 52:557–570
2. Lange C, Jentsch F, Allen J et al. (2015) Data Resource Profile: German Health Update (GEDA) – the health interview survey for adults in Germany. Int J Epidemiol 44(2):442–450
3. Robert Koch-Institut (Ed) (2011) Daten und Fakten: Ergebnisse der Studie „Gesundheit in Deutschland aktuell 2009". Beiträge zur Gesundheitsberichterstattung des Bundes. RKI, Berlin
4. Robert Koch-Institut (Ed) (2012) Daten und Fakten: Ergebnisse der Studie „Gesundheit in Deutschland aktuell 2010". Beiträge zur Gesundheitsberichterstattung des Bundes. RKI, Berlin
5. Robert Koch-Institut (Ed) (2014) Daten und Fakten: Ergebnisse der Studie „Gesundheit in Deutschland aktuell 2012". Beiträge zur Gesundheitsberichterstattung des Bundes. RKI, Berlin
6. Lange C, Finger JD, Allen J et al. (2017) Implementation of the European health interview survey (EHIS) into the German health update (GEDA). Arch Public Health 75:40
7. Europäisches Parlament (2018) VERORDNUNG (EU) 2018/255 DER KOMMISSION vom 19. Februar 2018 zur Durchführung der Verordnung (EG) Nr. 1338/2008 des Europäischen Parlaments und des Rates in Bezug auf Statistik auf der Grundlage der Europäischen Gesundheitsbefragung (EHIS). In: European Commission (Ed). Amtsblatt der Europäischen Union, P. L48/12–L48/38
8. von der Heyde C (2013) Das ADM-Stichprobensystem für Telefonbefragungen. https://www.gessgroup.de/wp-content/uploads/2016/09/Beschreibung-ADM-Telefonstichproben_DE-2013.pdf (As at 05.10.2020)
9. Sand M, Gabler S (2019) Gewichtung von (Dual-Frame-) Telefonstichproben. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 405–424

10. Kish L (1949) A Procedure for Objective Respondent Selection within the Household. J Am Stat Assoc 44(247):380–387

11. European Commission, Eurostat (2018) European Health Interview Survey (EHIS wave 3). Methodological manual. European Commission, Luxembourg

12. ADM (2021) Richtlinie für telefonische Befragungen. Arbeitskreis Deutscher Markt- und Sozialforschungsinstitute e.V., P. 1–9

13. Wetzstein M, Varga M, Lemcke J et al. (2019) Feldphase. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 241–292

14. Liebau M, Schunter J, Schurath R et al. (2019) Fragebogenkonstruktion bei telefonischen Befragungen. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 193–239

15. Schmich P, Lemcke J, Zeisler ML et al. (2018) Ad hoc surveys at the Robert Koch Institute. Journal of Health Monitoring 3(3): 70–80. https://edoc.rki.de/handle/176904/5778 (As at 21.07.2021)

16. Allen J, Lemcke J (2019) Ausschreibung einer Telefonstudie. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 435–471

17. Gramlich T, Häder S (2019) Methoden- und Feldberichte. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 425–434

18. American Association for Public Opinion Research (AAPOR) (2016) Standard definitions – final disposition codes of case codes and outcome rates for surveys. AAPOR, Deerfield

19. Bundesagentur für Arbeit (2011) Klassifikation der Berufe 2010. Band 2: Definitorischer und beschreibender Teil. Bundesagentur für Arbeit, Nürnberg

20. Bundesagentur für Arbeit (2011) Klassifikation der Berufe 2010. Band 1: Systematischer und alphabetischer Teil mit Erläuterungen. Bundesagentur für Arbeit, Nürnberg

21. ILO (2012) International standard classification of occupations (ISCO-08). Vol. 1: Structure, group definitions and correspondence tables. ILO, Genf

22. Häder S, Sand M (2019) Telefonstichproben. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 113–151

23. Bundesinstitut für Bau-, Stadt- und Raumforschung (2021) Laufende Raumbeobachtung – Raumabgrenzungen: Siedlungsstrukturelle Kreistypen. https://www.bbsr.bund.de/BBSR/DE/forschung/raumbeobachtung/Raumabgrenzungen/deutschland/kreise/siedlungsstrukturelle-kreistypen/kreistypen.html;jsessionid=4FBB924C0A196C0D8141D36DACB7E644.live11291?nn=2544954 (As at 07.04.2021)

24. UNESCO Institute for Statistics (2012) International Standard Classification of Education: ISCED 2011. UIS, Montreal, P. 85

25. Lumley T (2011) Complex Surveys: A Guide to Analysis Using R. Wiley, Hoboken, New Jersey

26. Hintzpeter B, Finger JD, Allen J (2019) European Health Interview Survey (EHIS) 2 – Background and study methodology. Journal of Health Monitoring 4(4):66–79. https://edoc.rki.de/handle/176904/6249 (As at 21.07.2021)

27. Hoebel J, von der Lippe E, Lange C et al. (2014) Mode differences in a mixed-mode health interview survey among adults. Arch Public Health 72(1):46

28. Schilling J, Buda S, Fischer M et al. (2021) Retrospektive Phaseneinteilung der COVID-19-Pandemie in Deutschland bis Februar 2021. Epidemiologisches Bulletin (15):3–12

29. Bates N, Zamadics J (2021) COVID-19 Infection Rates and Propensity to Self-Respond in the 2020 U.S. Decennial Census. Survey Practice 14(1):1–12

30. Damerow S, Rommel A, Prütz F et al. (2020) Developments in the health situation in Germany during the initial stage of the COVID-19 pandemic for selected indicators of GEDA 2019/2020-EHIS. Journal of Health Monitoring 5(4):3–20. https://edoc.rki.de/handle/176904/7550.2 (As at 21.07.2021)

31. von Hermanni H (2019) Rolle und Einfluss von Interviewern in telefonischen Umfragen. In: Häder S, Häder M, Schmich P (Eds) Telefonumfragen in Deutschland. Springer VS, Wiesbaden, P. 293–347

32. Hüfken V (2019) Telefonische Befragung. In: Baur N, Blasius J (Eds) Handbuch Methoden der empirischen Sozialforschung. Springer VS, Wiesbaden, P. 757–768

33. Groves RM, Peytcheva E (2008) The Impact of Nonresponse Rates on Nonresponse Bias: A Meta-Analysis. Public Opin Q 72(2):167–189

Imprint

Journal of Health Monitoring

Publisher
Robert Koch Institute
Nordufer 20
13353 Berlin, Germany

Editors
Johanna Gutsche, Dr Birte Hintzpeter, Dr Franziska Prütz,
Dr Martina Rabenberg, Dr Alexander Rommel, Dr Livia Ryl,
Dr Anke-Christine Saß, Stefanie Seeling, Dr Thomas Ziese
Robert Koch Institute
Department of Epidemiology and Health Monitoring
Unit: Health Reporting
General-Pape-Str. 62–66
12101 Berlin, Germany
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Kerstin Möllerke, Alexander Krönke

Translation
Simon Phillips/Tim Jack

ISSN 2511-2708

Note
External contributions do not necessarily reflect the opinions of the Robert Koch Institute.

The Robert Koch Institute is a Federal Institute within the portfolio of the German Federal Ministry of Health