Journal of Health Monitoring

3 Focus Health monitoring and health indicators in Europe

22 Focus Health and healthcare provision to asylum seekers and refugees in Germany

43 Fact sheet 12-Month prevalence of known diabetes mellitus in Germany

51 Fact sheet 12-Month prevalence of hypertension in Germany

58 Fact sheet 12-Month prevalence of coronary heart disease in Germany
<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>Fact sheet</td>
<td>12-Month prevalence of stroke or chronic consequences of stroke in Germany</td>
</tr>
<tr>
<td>70</td>
<td>Fact sheet</td>
<td>12-Month prevalence of allergies in Germany</td>
</tr>
<tr>
<td>75</td>
<td>Concepts &amp; Methods</td>
<td>German Health Update: New data for Germany and Europe</td>
</tr>
<tr>
<td>83</td>
<td>Concepts &amp; Methods</td>
<td>Diabetes Surveillance in Germany – Background, concept and prospects</td>
</tr>
</tbody>
</table>
Abstract
Demographic change, new health threats and inequalities in health and healthcare provision in and between European Union (EU) member states pose a great challenge to European health care systems. Not only for these reasons does it make sense to collect comparable European health data. Such information provides insights on the distribution of risk and protection factors, the prevalence of chronic diseases and the levels of care provided in the member states and supports the planning and implementation of (health) policy measures. Since 2013, in the context of the European Health Interview Survey (EHIS), all EU member states are obliged to collect data on the health status, the provision of healthcare, health determinants and socio-economic conditions of their populations. In Germany, the EHIS is integrated into health monitoring at the Robert Koch Institute (RKI). The RKI is thus Germany’s interface to the European health monitoring presented here. European health monitoring relies on different indicator systems such as the European Core Health Indicators (ECHI), EU social indicators and the health indicators of the European Sustainable Development Strategy. These are based on administrative and survey data, which stem for example from the EHIS or the European Union Statistics on Income and Living Conditions (EU-SILC) survey. Comparative data analyses must take into account the differences between health care systems, socio-economic conditions and the age structures of societies. Variances in the prevalence of allergies for example are also due to differences in the available diagnostic tools. Significant differences in the prevalence of hypertension in Europe (with a range of 20% for women and 17% for men) are also related to different levels of awareness of hypertension. Comparative analyses can support the planning of and provide information for policy measures, and enhance the sharing of experiences between EU member states. A forthcoming EU regulation aims to harmonise the content of and intervals between health and social statistical data collection. Moreover, plans exist to establish a European Research Infrastructure Consortium (ERIC), which is set to develop and institutionalise European health monitoring.
1. Background

‘Health’ has gradually developed as a European policy field. During the 1950s, the predecessor to the European Commission provided support to member states in the field of occupational health and safety for coal and steel industry workers. Today, European health policy covers fields such as disease prevention and control, provision of medicines and health research. Yet, for European citizens, the main responsibility for health policy and health care still remains at member state level. The EU supports, coordinates or supplements measures that are adopted by the member states (article 6 of the Treaty on the Functioning of the European Union, TFEU) [1].

Article 168 TFEU defines the framework and goals of this supplementing competency of the EU and emphasises the importance of health for all EU policy fields (see Info box 1).

To complement this, and in the face of current challenges to health care systems – demographic change, migration, the financial crisis, new health threats (such as pandemics, bio-terrorism and climate change) and advances in medical technologies – the EU developed its health strategy ‘Together for Health’. The strategy complements the Europe 2020 strategy and its focus on increasing productivity and competitiveness in the EU. Within this context, investments into health care are to help reduce health inequalities and combat social exclusion. Overarching values such as universality, access to good quality care, equity and solidarity are to guide the systems for the provision of healthcare in the EU and take into account the gender perspective [3].

For European health care systems to react adequately to the above-mentioned challenges and develop strategies to improve health will require regular data on the development of living conditions, health status and behaviour, and healthcare levels in Europe. The European statistics office (Eurostat), the Organisation for Economic Co-operation and Development (OECD) and the World Health Organisation (WHO regional office for Europe) all provide and publish data on health in Europe at regular intervals. Every two years, the OECD, in cooperation with the European Commission, publishes its Health at a Glance report [4] and every three years the WHO’s regional office for Europe publishes its European health report [5].

Indicators that aim for the greatest comparability between countries and allow for quantified assessments of the health status, health behaviour and determinants for health and well-being are the basis of these reports. In the following, this article focuses on EU indicator systems and their sources of data. As an example, it provides comparative analyses for selected chronic diseases from the second wave of the European Health Interview Survey (EHIS-2). To conclude, the article discusses the perspectives and limitations of European health monitoring.

2. EU health indicator (systems)

As standardised measures, indicators can help reveal processes, results or changes at a certain moment in time or over a period of time [6-8]. Standardised data collection on the basis of European health indicators is of fundamental importance for the development of national and Euro-

Info box 1: Treaty on the Functioning of the European Union, article 168 (Public Health)

“1. A high level of human health protection shall be ensured in the definition and implementation of all Union policies and activities. Union action, which shall complement national policies, shall be directed towards improving public health, preventing physical and mental illness and diseases, and obviating sources of danger to physical and mental health. Such action shall cover the fight against the major health scourges by promoting research into their causes, their transmission and their prevention as well as health information and education, and monitoring, early warning of and combating serious cross-border threats to health. [...]”

2. The Union shall encourage cooperation between the Member States in the areas referred to in this Article and, if necessary, lend support to their action. [...]"

3. The Union and the Member States shall foster cooperation with third countries and the competent international organisations in the sphere of public health. [...]"

7. Union action shall respect the responsibilities of the Member States for the definition of their health policy and for the organisation and delivery of health services and medical care [2].”
Comparable health data is needed to support the planning and implementation of health policy measures in Europe.

European research and health policies [9]. This helps identify and close gaps in the data and contributes towards data-based objectivity and scientific orientation of health policy discussions. EU indicator systems relevant to health include the European Core Health Indicators (ECHI), European social indicators and the public health indicators of the European Sustainable Development Strategy, which are described in more detail below. Numerous links exist between these systems and with sets of indicators on specific topics such as accidents or child and youth health.

2.1 European Core Health Indicators (ECHI)

At the end of the 1990s, the EU decided to establish “Community Health Indicators” [10]. Between 1998 and 2012, four projects (ECHI-1, ECHI-2, ECHIM, JA ECHIM) led to the development of the ECHI shortlist with 88 indicators (European Core Health Indicators). ECHI indicators rely on a large number of data sources. To ensure the comparability of data, each indicator has a defined preferred data source (such as Eurostat) and a preferred type of data (such as survey data) [11]. Section 3 (“Data sources for EU health indicators”) describes a number of data sources for EU health indicators in detail. Data collected on the basis of the ECHI indicators can be accessed, downloaded or visualised in aggregated form on the EU’s publicly accessible ECHI Data Tool [12].

The declared aim was not to select indicators based solely on data availability [13]. Correspondingly, the ECHI shortlist is divided into three sections that reflect the different degrees of implementation readiness of specific indicators. Data from defined international data sources from the preferred type of data is available for 67 indicators (implementation section). A further 14 indicators (work-in-progress section) have been sufficiently developed both at the conceptual and methodological level, yet final obstacles to their Europe-wide implementation remain. The third group (development section) comprises topics of issues that, although relevant to health policy, still require discussion before they can be developed conceptually and methodologically into indicators [11]. The inclusion of new indicators or the transfer of indicators between sections is based on consensually decided criteria. Documentation forms are available for all indicators and structured remarks on their comparability are provided for most of them. The majority of implemented indicators can be stratified according to age, gender, education and region where this is considered useful.

The implementation of indicators in the health information systems of member states began in 2005. Numerous EU countries have already implemented ECHI indicators in national health monitoring. Federal health reporting data in Germany is also provided according to the definitions in the ECHI shortlist.

The further development of the ECHI shortlist is part of the EU-funded BRIDGE health project (BRidging Information and Data Generation for Evidence-based health policy and research). Generally, the goal is to keep the list of indicators as stable as possible. For different reasons, however, it may become necessary to update indicators. Such reasons include changes to EU health surveys, new relevant public health concerns or changes to health policy concepts. A good example here are shifts in the con-
ceptual approaches toward disability. Whereas in the past questions used to focus on a person’s disabilities, they today ask about the barriers people with disabilities face for their full participation in society [14]. Figure 1 illustrates the policy fields, sections and data of ECHI indicators.

Cancer incidence, self-reported prevalence of asthma, diabetes, depression and chronic obstructive pulmonary disease (COPD) are all among the non-communicable diseases ECHI indicators currently monitor. Indicators for acute myocardial infarction (AMI), stroke and regis-

---

**Shortlist sections:**
- ‘Implementation’
- ‘Work-in-progress’
- ‘Development’

**Operational indicators:**
- Age (available for 60 indicators)
- Gender (available for 54 indicators)
- Education (available for 43 indicators)
- Region (ISARE; available for 43 indicators)

**Chapter:**
- Demography and socio-economic situation
- Health status
- Determinants of health
- Health services
- Health promotion

**Policy fields:**
- Health care provision
- Ageing and population
- Health determinants
- Diseases and mental health
- Health in all policy fields

**Data sets:**
- International and European disease registries
- EU and European institutions (Eurostat, research and surveillance agencies, foundations, databases, consortia)
- Databases of international organisations (OECD, UN, WHO)

**Data types:**
- Administrative and registry data
- Population data
- Census data
- Surveillance data
- Survey data

**Application:**
- National and European level health monitoring

---

**The key European indicator systems are the European Core Health Indicators (ECHI), EU social indicators and the health indicators of the European Sustainable Development Strategy.**

---

**Fig. 1**
ECHI shortlist structure, data sets, application
Source: own chart based on [16, 17]
ter-based prevalences of asthma, COPD, diabetes, dementia and depression are still under development. Cause of death statistics are a further source of information on disease in Europe. The corresponding indicator in the ECHI shortlist (indicator 13) includes 26 ICD-10 causes of death. Cause of death statistics, however, offer no information on disease incidence and prevalence. Future Europe-wide diagnosis-specific morbidity statistics should close this gap also in the data on chronic disease. Eurostat in collaboration with EU member states is currently conducting corresponding pilot studies [15].

2.2 EU social indicators relevant to health

In addition to the Core Health Indicators, the system of EU social indicators also reflects questions relevant to health. They are embedded in the context of EU social policy and focus on healthcare provision and long-term care (see Info box 2; Figure 2).

In 2010, the Europe 2020 strategy succeeded the Lisbon Strategy and provided a greater focus on questions of health in Europe. The 2013 EU Annual Growth Survey emphasised the need to analyse how the healthcare systems of member states can manage the twofold challenge

---

**Info box 2: EU social indicators**

EU social indicators are an instrument that was developed in the context of the strategy to promote growth, a dynamic economy and social cohesion in the EU (the Lisbon Strategy), adopted by the European Council in 2000. In social policy, the EU has shared competence and coordinating capacity (articles 4 and 5 TFEU) [1]. To implement the goals of the Lisbon Strategy, Europe developed the open method of coordination (OMC). The method was ‘launched [...] as voluntary self-evaluating process, based on common objectives, [...]’ [18]. In the area of health, social indicators are to allow for self-evaluation, comparison and benchmarking in healthcare and long-term care provision. Since 2005, social indicators have been the basis for the European Survey on Income and Living Conditions, EU-SILC. It comprises the Minimum European Health Module (MEHM), consisting of seven variables [19].
of ensuring access to high quality healthcare services whilst keeping the costs at manageable levels in the long term [18, 21]. Moreover, the strategy in particular recognised the need to reduce inequalities between member states, regions and socio-economic groups [22]. Adjusted indicators to reflect this fact are being developed at EU level with the participation of member states. These efforts are based on the Joint Assessment Framework (JAF) method [23]. JAF health indicators aim to enhance the evidence basis of EU health policy activities and recommendations to member states [24]. The set of indicators currently being developed includes EU social indicators and indicators from the ECHI shortlist. Among these are outcome indicators such as life expectancy, healthy life years, self-perceived health, infant mortality and causes of death. Further indicators shed light on the accessibility and quality of healthcare services such as unmet healthcare needs, vaccination coverage, screening, avoidable hospital admissions as well as on health determinants (tobacco and alcohol consumption, physical activity, obesity, and fruit and vegetable consumption). Additional (called contextual) indicators provide information on healthcare expenditure as well as on sociodemographic factors [25]. The set of indicators differentiates between EU indicators, national (NAT) indicators as well as contextual indicators. Only EU indicators are applicable for comparisons between member states.

2.3 Sustainability indicators

In 2001, the European Council adopted the EU Sustainable Development Strategy, which was renewed in 2006. Public health is one of the ten issues the EU has identified as key challenges to sustainable development and for which it states targets, operational objectives and actions. Progress is measured based on around 130 indicators [26].

Focuses for the complex of public health are the promotion of good public health on equal conditions for all citizens and improved protection against health threats. Indicators such as life expectancy, healthy life years and chronic disease mortality rates are important as is data on the production of toxic chemicals, air or noise pollution and accidents at work. Further indicators include unmet healthcare needs, long-term illness or health conditions [27]. The sustainability indicators are also based on administrative health data as well as on data from social and economic monitoring. Every two years, a monitoring report is published; the most recent one was published in September 2015 [28].

Some are stand-alone health surveys, whilst others contain health-related modules or variables within a larger overarching complex of issues. Table 1 presents an overview of European health surveys and indicators. The following section then focuses on the most important data sources for health indicators.

3. Data sources for EU health indicators

Data availability is addressed early in the process of conceptualizing and developing European and international sets of indicators. This ensures that meaningful and comparable data will be available for all countries involved. Individual indicators are taken from different
Table 1
Data sets for European health statistics
Source: [27, 29]

<table>
<thead>
<tr>
<th>Data sets for European health statistics</th>
<th>Focus</th>
<th>Health indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>EHIS (European health interview survey)*</td>
<td>Health</td>
<td>Demography and socioeconomic situation, health status, health determinants and measures by the healthcare system</td>
</tr>
<tr>
<td>EU-SILC (EU statistics on income and living conditions)*</td>
<td>Income and living conditions</td>
<td>Health status and utilisation of the healthcare system (minimum European health module: MEHM, seven variables)</td>
</tr>
<tr>
<td>OECD/Eurostat/WHO in the System of Health Accounts (SHA)</td>
<td>Health expenditure</td>
<td>Including costs of investments in the health sector, income from programmes to finance healthcare, contributions to cover the costs of healthcare goods and services, health expenditure based on essential characteristics of service recipients</td>
</tr>
<tr>
<td>OECD/Eurostat/WHO Europe on non-monetary health care benefits</td>
<td>Health care system resources and measures</td>
<td>Hospital discharges, hospital stays, medical procedures, selected preventive measures and consultations</td>
</tr>
<tr>
<td>Causes of death</td>
<td>Cause of death statistics</td>
<td>ICD causes of death</td>
</tr>
<tr>
<td>Accidents at work</td>
<td>Statistics on accidents at work</td>
<td>Non-fatal/fatal accidents at work</td>
</tr>
<tr>
<td>Diagnosis-specific morbidity (pilot phase, regular data collection possibly from 2020)</td>
<td>Incidence and prevalence of diseases</td>
<td>Diseases (list currently under development)</td>
</tr>
</tbody>
</table>

* planned future implementation under the Framework regulation for the production of European statistics – Integrated European Social Statistics, IESS [30]
OECD=Organisation for Economic Co-operation and Development; Eurostat=Statistical office of the European Union; WHO=World Health Organisation; ICD=International classification of diseases

Among these are the EU's statistical office (Eurostat), the World Health Organisation’s European ‘Health for all’ database (HFA-DB) [31], the database of the Organisation for Economic Co-operation and Development (OECD) [32] as well as international reporting systems for specific issues, for example on tobacco, alcohol and drug consumption, accidents or environmental monitoring. The types of data include official statistics, interview and administrative data. Eurostat for example provides demographic data, population projections, data on mortality, life expectancy, fertility, migration and citizenship based on official statistics for all EU member states. The European Union Labour Force Survey (EU LFS), conducted by all EU member states, two EU candidate countries and three countries of the European Free Trade Association, provides important data on the labour market and employment.

Important survey data for health indicators at European level stems from the European Survey on Income and Living Conditions (EU-SILC) and from the European Health Interview Survey (EHIS). One quarter of implemented ECHI indicators is collected in the context of EHIS [33].
3.1 European Survey on Income and Living Conditions (EU-SILC)

EU-SILC is the EU’s source of reference for comparable statistical data on income distribution and social inclusion at European level. The survey provides two types of data on an annual basis for the 28 EU members, Iceland, Norway, Switzerland and Turkey:

- Cross-sectional data at a particular moment or time-span on income, poverty, social exclusion and further living conditions;
- Longitudinal data on changes over time at individual level, periodically surveyed during a specific period, usually four years.

The fundament of EU-SILC is a shared “common framework” and not a unitary questionnaire or joint data collection. This framework consists of a harmonised list of primary (annual) and secondary (collected at least every four years) target variables, which countries commit to transmitting to Eurostat. It also contains overarching guidelines and procedures, shared concepts (household and income) and classifications to ensure the greatest possible comparability of the data provided [34]. EU-SILC was initially implemented throughout Europe with framework regulation (EC) 1177/2003 in 2005. In the 2014 wave, the sample in Germany covered 12,744 households and 22,695 people aged at least 16.

The overarching goal and primary purpose of EU-SILC is to provide European and national level social policy with a well-grounded basis for decisions. EU-SILC provides the basis for monetary and non-monetary social indicators. An important social indicator provided by EU-SILC is the at-risk-of-poverty rate [35]. Included in EU-SILC is the Minimum European Health Module [36], which surveys people’s self-perceived health, the presence of chronic diseases and of long-standing limitations in daily activities (Global Activity Limitation Indicator, GALI). This module is also part of the EHIS. Further health-related surveys could in future also use parts of this module. GALI data is used to calculate the Healthy Life Years (HLY) indicator (also called disability-free life expectancy). In the Lisbon Strategy, the indicator belonged to the group of core European structural indicators. Today, HLY is one of two public health headline indicators in the EU’s Sustainable Development Strategy. EU-SILC also includes questions on why people did not go to see a doctor or a dentist, even though this would have been medically necessary [35].

3.2 European Health Interview Survey (EHIS)

A 2008 EU regulation [37] called on member states to supply health statistics in the following domains: health status and health determinants, causes of death, health care, accidents at work, occupational diseases and other work-related health problems and illnesses. The European Health Interview Survey (EHIS), which is to be conducted every five years, is to serve as the primary basis for data on health status and health determinants. EHIS is an interview survey which relies on the self-assessment of participants. Unlike in examination surveys, no measurements are collected. The first wave of EHIS was conducted between 2006 and 2009. Participation
in EHIS 1 was not mandatory and 17 member states took part [38]. Germany partly included the EHIS instrument in the Robert Koch Institute’s (RKI) German Health Update (GEDA 2010) survey and supplied Eurostat with results for certain health indicators.

After an intensive process of evaluation of the first wave, development of the second and mandatory wave of EHIS began. The modules on mental health, physical activity as well as on alcohol consumption underwent revision. After two further years of work and discussion to develop a binding catalogue of questions, an EU regulation was adopted in February 2013 that defined the EHIS variables, reference year and population as well as the required reference meta data [39].

EHIS consists of four modules on health status (self-assessed), health care, health determinants and background demographic and socio-economic status variables. To ensure the broadest possible comparability of the data received from member states, Eurostat also developed a detailed manual, which also includes a model questionnaire [40]. The German language questionnaire is provided as a supplement to this edition. Data should be collected during the reference years 2013, 2014 or 2015. In Germany, EHIS 2 was integrated into GEDA 2014/2015. Beyond the EHIS questions, this survey asked further nationally relevant questions to continue earlier time series and/or collect information on specific public health aspects.

The EU regulation on EHIS lists all the variables for the survey including the answer categories. Countries freely choose their method of data collection and define the details of how the survey is conducted. EHIS can be conducted as a stand-alone survey or EHIS questions can be integrated into a national health survey, as was the case in Germany. A further article in this edition describes the methodology applied in GEDA 2014/15-EHIS. EHIS also defines the target population (individuals aged 15 and over living in private households residing in the territory of the Member State at the time of the data collection) and the sample size each country needs to achieve (in total around 195,000 participants in EU member states). To assist data processing and data quality assurance, Eurostat provides detailed documents and electronic tools. Eurostat controls the microdata received from member countries for plausibility and completeness. Each country is required to fill out a detailed quality report based on pre-defined criteria, which details information on the methodological approach chosen by each country.

Based on this quality assured data, Eurostat calculates indicators, which the office usually stratifies according to age, gender and education levels. These are available on the Eurostat website [41].

4. Chronic diseases as an example of EHIS results

EHIS delivers standardised and periodically collected core indicators for health monitoring from all countries at European level. EHIS thereby mainly contributes indicators on health status and health determinants for which no broad and comparable data basis was so far available from the various countries. In addition to the European indicator systems (mentioned above) and the possibility to access indicators through the Eurostat database [41], the indicators will be used by the national health reporting systems. In Germany, the Journal of
Health Monitoring publishes Fact sheets on specific indicators and updates these over time taking into account newly collected data. The Fact sheets in this issue discuss indicators for selected chronic diseases with particular public health relevance: coronary heart disease, stroke, hypertension, diabetes and allergies. Future issue of the Journal of Health Monitoring will focus on further indicators such as arthrosis, asthma and other chronic lower respiratory infections (chronic bronchitis, chronic obstructive pulmonary disease and emphysema), which are presented in brief below.

Overall, EHIS collected information on the occurrence of fifteen frequent chronic diseases and health conditions through the following question: ‘During the past 12 months, have you had any of the following diseases or conditions?’ Very clearly, therefore, the survey asked for self-perceived illnesses and not self-reported medical diagnoses, diagnostic criteria based on objective measurements or other disease-specific information such as taking certain medications. 12 months was chosen as a reference period because from a health policy point of view information on the current prevalence of a disease in the population is of higher value than its lifetime prevalence. Moreover, this establishes a direct reference to ECHI indicators 21a (self-reported diabetes), 23a (self-reported depression), 26a (self-reported asthma), 27a (self-reported COPD) and 43 (self-reported high blood pressure) that are all based on twelve-month prevalence. Table 2 shows the fifteen diseases considered in the EHIS 2 survey.

There are, however, inherent limitations of international comparisons of EHIS indicators, just like with other international indicator systems. On the one hand, this is due to the indicators themselves. On the other hand, in spite of all efforts to make data collection comparable, numerous differences between countries exist in life expectancy, age structure, the organisation and performance of the healthcare system, factors concerning the socio-economic context and cultural factors; these have to be taken into account when interpreting results [42]. Consequently, simple benchmarking, e.g. a one-dimensional perspective on the ranking of individual indicators, makes little sense, even more so since Eurostat so far does not provide age-standardised prevalence data.

Figures 3 and 4 therefore present the prevalence of the above-mentioned selected chronic diseases according to

---

### Chronic diseases considered in the EHIS 2 survey

<table>
<thead>
<tr>
<th>Chronic diseases considered in the EHIS 2 survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma (allergic asthma included)</td>
</tr>
<tr>
<td>Chronic bronchitis, chronic obstructive pulmonary disease, emphysema</td>
</tr>
<tr>
<td>Myocardial infarction or chronic consequences of myocardial infarction</td>
</tr>
<tr>
<td>Coronary heart disease or angina pectoris</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Stroke or chronic consequences of stroke</td>
</tr>
<tr>
<td>Arthrosis (arthritis excluded)</td>
</tr>
<tr>
<td>Low back pain or other chronic back symptoms</td>
</tr>
<tr>
<td>Neck pain or other chronic neck symptoms</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
<tr>
<td>Allergy, such as rhinitis, hay fever, eye inflammation, dermatitis, food allergy or other (allergic asthma excluded)</td>
</tr>
<tr>
<td>Cirrhosis of the liver</td>
</tr>
<tr>
<td>Urinary incontinence, bladder control problems</td>
</tr>
<tr>
<td>Chronic kidney disease or renal failure</td>
</tr>
<tr>
<td>Depression</td>
</tr>
</tbody>
</table>
Fig. 3
12-month prevalence of selected diseases among women in Germany compared to the EU-28 mean
Source: EHIS 2014/15

Fig. 4
12-month prevalence of selected diseases among men in Germany compared to the EU-28 mean
Source: EHIS 2014/15

COPD = Chronic obstructive pulmonary disease
Fig. 5
12-month prevalence of arthrosis, hypertension and allergies among women, Germany and EU-28 according to age
Source: EHIS 2014/15

Prevalence (%)

Age (years)

Fig. 6
12-month prevalence of arthrosis, hypertension and allergies among men, Germany and EU-28 according to age
Source: EHIS 2014/15

Prevalence (%)

Age (years)

gender in Germany in comparison with the EU average including the range between the lowest and highest reported values. This analysis did not include indicators referring to symptoms, to low-prevalence conditions or to mental health.

Whilst prevalence of individual diseases varies considerably across the EU, patterns in women and men are quite similar. Country-specific prevalences of asthma and other chronic lower respiratory infections, myocardial infarction, stroke, coronary heart disease and diabetes vary by less than ten absolute percentage points. Variation in prevalence is much higher in hypertension (20% in women, 17% in men), arthrosis (29% in women, 15% in men) and allergies (35% in women, 25% in men).
Figures 5 and 6 focus on the three chronic diseases with the largest cross-country differences and show prevalences according to age and gender for Germany compared to the EU average. The results confirm for all three diseases that prevalences are high in Germany as reported from various previous health surveys [43-46]. For both genders, the estimated prevalence of arthrosis and hypertension in Germany is slightly higher than the EU average and considerably higher for allergies. Also in line with earlier data from Germany, a clear correlation was found between age and prevalence of these diseases. A consistent age-related increase in the prevalence of arthrosis and hypertension, and an age-related decrease in the prevalence of allergies were found for women and men [43-46]. The Fact sheets on allergies and hypertension in this issue also point to this fact.

Prevalence of arthrosis
In Germany slightly more respondents reported suffering from arthrosis than the EU average across all age groups. The range of prevalence rates among men was between 1.8% and 17.1% (10.1% across the EU, 12.8% in Germany), and between 2.7% and 31.8% among women (18.0% across the EU, 20.9% in Germany). Globally, arthrosis is the most common disease of the joints and mainly affects people in the second half of life. The percentage of those affected increases with age, and women are affected more frequently than men [47]. In contrast to diseases with early detection programs like diabetes (medical check-up examinations measuring glucose levels), arthrosis is usually not detected until joints (frequently the hips, knees, arms and hands, shoulders, ankles or feet) are affected. Only medical specialists using imaging techniques can explain to what degree these symptoms are related to joint degeneration. Both people’s perception of joint problems and also their diagnosis differ between countries [48, 49]. Moreover, when asked about arthrosis, people will often include all kinds of problems with their joints, without having a physician-diagnosed arthrosis. Obesity, joint injuries at a younger age and hard physical work are considered important risk factors for arthrosis and these factors are spread unevenly in the EU. Individually and in combination, these factors contribute to the differences in prevalence.

Prevalence of hypertension
Large differences in the prevalence of hypertension across Europe have also been reported previously from examination surveys [50]. Since not only the prevalence of hypertension, but also people’s awareness of hypertension, varies between European countries, the differences in prevalence within the EU revealed by the EHIS indicator ‘self-reported hypertension in the past 12 months’ are hardly surprising. For men, prevalences range between 12.9% and 29.4% (EU-wide 20.2%, Germany 29.2%) and for women between 14.9% and 34.2% (EU-wide 21.7%, Germany 27.8%). As other analyses have shown, the higher prevalence of self-reported hypertension among women is due almost entirely to their greater awareness of hypertension. When diagnosed in examination surveys, however, which also account for undetected cases of hypertension, the prevalence of the condition is higher among men in most populations [51].
Data analysis must take into account the differences between health care systems, socio-economic conditions and/or age structures.

EHIS prevalences of self-reported hypertension in some countries are slightly lower, in other countries considerably lower than prevalence of known hypertension reported from country-specific examination surveys [50]. One reason could be that EHIS questionnaires do not grant that participants who take medicines and whose hypertension is therefore controlled identify themselves as having hypertension. This point should be discussed in a review and further development of EHIS indicators. For the corresponding indicator in the ECHI shortlist (indicator 43), this point was annotated to be considered during a later review [11].

5. Discussion and outlook

Chronic diseases are among the great challenges for which not only the EU member states have to prepare. International and European comparisons on the basis of shared indicators can broaden the perspective of national health reporting and reveal the need for (health) policy action. They can also provide a basis for EU member states to share their experiences. Still, methodological and structural constraints need to be considered which hamper European and international comparisons. To illustrate, Eurostat, WHO or OECD data, which is used in international comparisons, or data from specific surveys may vary from the data used at national level for the same matter. Moreover, national reports may show different values than international reports for certain indicators (such as the mortality rate) if data has been standardised for age for an international comparison. Different statistical procedures can also lead to differences between national and international results. As concerns the ECHI, remarks on comparability have been developed for those indicators which are not based on EHIS data, but for which data from other international sources is available. They explain the factors that need to be taken into account in cross-country comparisons or that have led to the interruption of time series in data collection. In addition, contextual factors have to be considered in the interpretation of comparisons between countries and regions. These include the heterogeneity of healthcare systems in Europe, the
differences in the availability of relevant data (information inequality) as well as cultural differences in understanding and dealing with health and illness. The critical appraisal of the EHIS data presented here exemplifies this fact.

Numerous projects at European level promote the further development of social and health indicators, aiming to improve the availability and comparability of data. To illustrate, so far, social statistics surveys in Europe were implemented on the basis of separate regulations. In the context of modernising European social statistics, they shall become integrated into the single framework of the Integrated European Social Statistics (IESS) regulation. This is to ensure that there is a stable data basis to strengthen the EU’s social goals. The process began in 2014, aims for adoption between 2017 and 2018, and implementation in 2019.

In the same vein, namely to provide better and comparable information on the health of Europeans which would allow the EU to evidence-base its health policy activities, plans are progressing towards the establishment of a European Health Information System. The preferred structure is that of a European Research Infrastructure Consortium on Health Information for Research and Evidence-based Policy (HIREP-ERIC). An ERIC is an international institution borne by its participating countries and is open not only to members of the EU but also to third countries and specialised agencies. Significant work to this end is done in the EU-funded BRIDGE Health project (2015-2017, http://www.bridge-health.eu). The further development of ECHI indicators and their increasing implementation in the systems of EU member states, EU candidate countries as well as the European Free Trade Association (EFTA) countries will be among the most important activities. A sustainable EU infrastructure for health information creates the necessary framework, continuity over time and platform for exchanges between experts. The overarching goal remains to improve the availability and comparability of data relevant to health, strengthen the evidence basis for policy and promote the exchange of knowledge in Europe.

References


http://edoc.rki.de/oa/articles/remfPnBNKET/PDF/260- jP9h96xw.pdf (As at 01.03.2017)

http://www.rki.de/DE/Content/Gesundheitsmonitoring/Gesundheitsberichterstattung/GBEDownloadsB/GEDA12.pdf?__blob=publicationFile (As at 01.03.2017)


Health monitoring and health indicators in Europe

Imprint

Publisher
Robert Koch Institute
Nordufer 20
D-13353 Berlin, Germany

Editors
Dr. Franziska Prütz, Martina Rabenberg,
Alexander Rommel, Dr. Anke-Christine Saß,
Stefanie Seeling, Martin Thißen, Dr. Thomas Ziese
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin, Germany
E-mail: healthmonitoring@rki.de

Conflicts of interest
The authors declared no conflicts of interest.

Please cite this publication as
ISSN 2511-2708

This work is licensed under a Creative Commons Attribution 4.0 International License.
Health and healthcare provision to asylum seekers and refugees in Germany

Abstract
The wars and devastation of recent years have driven many people to flee their homes. Great numbers of asylum seekers and refugees have sought protection in Europe. In 2015 and 2016 alone, over one million people applied for asylum in Germany. This has posed a great challenge for Germany’s healthcare provision facilities. The health of asylum seekers and refugees and the provision of their healthcare is therefore an important issue in terms of public health.

The first part of this article describes the extent and legal framework of immigration to Germany during the past two years. The second part then discusses the issue of health and medical care for asylum seekers and refugees. Until now, no representative data on the health of this population exists. Studies so far have all relied on a small number of cases and been limited to particular regions and are therefore hard to compare. Moreover, there are no sufficiently standardised medical examinations during initial reception across all German federal states. Relevant findings suggest an urgent need to take action in the fields of mental health, chronic diseases and the provision of care to children of asylum seekers. A review of the data available proves the need for a national and systematic collection of valid data as a basis for adequate preventive and medical care. Different initiatives currently aim to improve the data collection basis in Germany. Over time, these new initiatives will significantly improve the data available on the health situation of asylum seekers and refugees in Germany. Once politics and broader society take these findings into account, this should contribute to an objective debate and evidence-based decisions.

1. Introduction
The number of refugees seeking protection in Germany from war, persecution and other emergencies has increased significantly in the course of 2015 and 2016. Although tighter controls at the EU’s external borders as well as the closure of the most important routes for refugees have led to a decrease in numbers, the challenges of providing adequate care to asylum seekers and refugees and ensuring their integration into society remain basically unchanged (see info box on asylum seekers and refugees). From a public health point of view, the key questions surround health and healthcare needs and whether the facilities and provision of care, as well
as the legal framework conditions, can answer the specific needs of asylum seekers and refugees.

So far, Germany, like most other EU countries, lacks the data for a clear picture of asylum seekers’ and refugees’ health and healthcare needs. Most studies to date have relied on a small number of cases and were limited to a particular region [1]. Data collection is not standardised and data is therefore hard to compare [2]. Recent initiatives, however, promise to establish a robust data basis for research and health reporting as well as political decision-making and measures. These initiatives aim for standardised data collection during initial reception examinations and gaining access to data from statutory health insurance funds. Proposals have been made to include asylum seekers and refugees, who have been in Germany for longer, in larger studies such as the Robert Koch Institute’s health survey.

This article summarises the findings available on the health situation of asylum seekers and refugees in Germany and the health care they receive. As such, it highlights current data and information gaps as well as the difficulties resulting from the legal framework conditions for the use of data and also for healthcare. To conclude, the article gives a detailed presentation of initiatives which will improve the available data. Firstly, however, the article discusses the specificities of the asylum application procedure in Germany as well as the trend in the numbers of asylum applications and refugees.

2. The asylum procedure and its legal framework

Germany’s Basic Law (Basic Law Article 16a) enshrines the fundamental right for all those suffering political persecution to apply for asylum. The country’s Asylum Act (AsylG) as shown in a simplified manner in figure 1 then regulates the actual asylum procedure. People with non-German citizenship may apply for asylum in Germany directly at the border, with the immigration authorities, the security authorities or at reception centres. They are registered and sent to the closest initial reception centre in that German federal state. The centre provides asylum accommodation and informs the closest branch of the Federal Office for Migration and Refugees. At this branch office, asylum seekers then personally apply for asylum. Before they can do so, however, the Federal Office for Migration and Refugees will determine whether that person can apply for asylum in Germany or has to do so in another country. In this case, Germany would, in accordance with the Dublin III regulation (EU regulation no. 604/2013 of the European Parliament and the Council of 26 June 2013) return the asylum seeker to that country for the asylum application to be assessed there (Dublin procedure). In most cases, this will be the country where an applicant first reached the European Union (EU). Due to the great increase in the number of asylum seekers, in particular southern European nations along the EU’s external border (Greece, Italy) however frequently no longer enforce this regulation. Only very few asylum seekers are therefore returned to other countries based on the Dublin procedure. Based on Germany’s third country regulation, which was adopted in 1993,
people who enter Germany coming through other EU member states or safe third countries of origin can no longer apply for asylum in Germany on grounds of political persecution. Gaining recognition as a refugee in accordance with the Geneva Refugee Convention however remains possible.

Refugees who are minors and arrive in Germany without their parents (unaccompanied minors) seeking protection are referred to the closest youth welfare office according to Sections 42 and 42a of Germany’s Social Code, the SGB (Sozialgesetzbuch VIII), book eight, and are put in guardianship. A clearing procedure then exhaustively clarifies the situation of the unaccompanied minor. This includes verification of identity, search for family members and, where doubts exist, determining the minor’s age, assessing their overall health, and clarifying their residence status. Finally, a decision on whether or not to file an application for asylum is taken.

The Federal Office for Migration and Refugees audits all applications for asylum, calls applicants for a hearing and then takes a decision. Decisions on substance fall into one of the following four groups. A person may either be recognised as an asylum seeker according to Article 16a of the German Basic Law, as a refugee according to Section 3 subsection 1 AsylG, be granted subsidiary protection according to Section 4 subsection 1 AsylG or their application is rejected (figure 1) [3]. Recognised asylum seekers and refugees are granted a residence permit valid for three years. In most cases they will then receive permanent residency [3]. Applicants that do not obtain recognised refugee status are granted subsidiary protection if upon return to their countries of origin they would face serious threats to their well-being. These persons are awarded the right to stay in Germany for one year, a right which can be extended. In cases where it rejects an asylum application, the Federal Office for Migration and Refugees will determine whether the applicant’s life, health or freedom is threatened in his or her country of origin. If so, the office can pronounce a ban on deportation for that person in accordance with Section 60, subsections 5 or 7 of the Residence Act (AufenthG). If not, the applicant will be asked to leave the country or face deportation. If the office rejects an asylum application on grounds of considering the application unfounded or manifestly unfounded, the applicant must leave the country within thirty days or one week, respectively. The applicant can appeal against the decision of the Federal Office for Migration and Refugees. In addition to these decisions on substance, there are also decisions for formal reasons. These include Dublin procedure decisions, cases in which asylum seekers revoke their application and decisions in subsequent applications where a decision is taken to end the procedure [4].

3. Trend in the number of applications for asylum

According to the Federal Ministry of the Interior, 890,000 asylum seekers arrived in Germany in 2015 [6]. Estimates had reckoned with up to 1.1 million asylum seekers. The difference between these two figures results primarily from people registering twice in the system for the initial distribution of asylum seekers (EASY). EASY only registers an asylum seeker’s country of origin and destination and then anonymously distributes them between
Fig. 1
Applying for asylum in Germany
Source: This figure is based on material from the Federal Office for Migration and Refugees [3, 5]

1. Arrival and registration in Germany
2. Initial assignment of asylum seekers (EASY) to individual federal states
3. Registration and accommodation at the relevant reception facility
4. Personal application for asylum at the Federal Office
5. Applicability of the Dublin Procedure
6. Personal hearing at the Federal Office
7. Decision:
   - Outright rejection (Exit order)
   - Rejection as “unmanifestly unfounded” with a notice to leave the country (Exit order)
   - Urgent motion (for suspensive effect)
   - Appeal (has suspensive effect)

Right of Residence / right to stay
- Residence permit for three years
- Residence permit for one year (repeated extensions possible for two years in each case)
- Residence permit for at least one year (repeated extensions possible)

Obligation to leave
- 30 day period for leaving (Responsibility: Immigration authorities)
- One week period for leaving (Responsibility: Immigration authorities)

Acknowledgement of entitlements to asylum seeker
- Art.16a, Basic Law

Award of refugee protection
- Section 3 AsylG

Award of subsidiary protection
- Section 4 AsylG

Imposition of a ban
- Section 60 V+ VII AufenthG

Emergency measure for asylum seeker
- Art.16, Basic Law

Award of refugee protection
- Section 3 AsylG

Award of subsidiary protection
- Section 4 AsylG

Imposition of a ban
- Section 60 V+ VII AufenthG

Urgent motion (for suspensive effect)

Deadline: 2 weeks

Legal remedies
- Appeal (has suspensive effect)

Deadline: 2 weeks

Deadline: 2 weeks

Deadline: 1 week

Deadline: 1 week

For adults

Simplified diagram of the asylum procedure for adults
(does not include every theoretically possible case)
AsylG = Asylum Act, AufenthG = Residence Act

federal states. EASY does not register if a person travels or returns [6]. Meanwhile, the law on improved data exchange Germany implemented in February 2016 has reduced the risk of multiple registrations, as in most cases asylum seekers’ biometric data is registered as soon as they express their wish to apply for asylum [7].

In 2015, the number of registrations in EASY was significantly higher than the total of around 480,000 asylum applications. One reason was that staff shortages at the Federal Office for Migration and Refugees led to delays in the registration and processing of asylum applications. This situation has changed greatly today. The number of asylum seekers who have recently arrived has dropped significantly, yet a high number of open cases means the number of asylum applications currently being processed remains high. In 2015, the Federal Office
Health and healthcare provision to asylum seekers and refugees in Germany

processed 476,649 applications for asylum. 441,899 were first-time applications and 34,750 follow-up applications [4]. Compared to year before, the number of applications rose by 155.3%. In 2016, there were 745,545 applications. Of these, 722,370 were first-time applications and 23,175 follow-up applications [8]. Compared to 2015, this implies a 56.4 percent increase in asylum applications. At the end of December 2016, 433,719 applications for asylum remained pending at the Federal Office for Migration and Refugees [9].

In 2015 and 2016, Syria, Afghanistan and Iraq were the most important countries of immigration (figure 3). In 2016, three quarters of all asylum applications came from one of these three countries (Syria, 36.9%; Afghanistan, 17.6%; Iraq, 13.3%) [8]. A clear drop in the number of applications was registered in 2015 and 2016 for people from Albania and Kosovo, which were declared safe countries of origin in autumn 2015 [10].

In 2015 (69.2%) [4] and 2016 (65.7%) [8], the majority of asylum seekers was male. This gender distribution ruled across all age groups with the exception of those aged “sixty-five and older” where the number of female applicants was greater (2015: 53.4%, 2016: 54.2%). The majority of applicants was under thirty (2015: 71.1%, 2016: 73.8%) and a third of these asylum seekers was aged under eighteen [4, 8].
In particular, the number of applications for asylum by unaccompanied minors (14,439 applications) increased markedly in 2015 and more than tripled compared to 2014. In 2015, the majority of unaccompanied minors came from Afghanistan (32.9%), followed by Syrians (27.6%), Eritreans (9.3%) and Iraqis (9.3%) [4]. The trend for 2016 points to a further increase in first-time applications for asylum by unaccompanied minors to 35,939 [11].

### 3.1 Decisions on asylum applications by the Federal Office for Migration and Refugees in 2015 and 2016

The following overview shows the decisions and decision rates regarding asylum applications taken by the Federal Office for Migration and Refugees for 2015 and 2016 (table 1). If one relates the number of positive decisions e.g. that led to some form of residence permit (recogni-

Table 1: Decisions and decision rates for asylum applications in 2015 and 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Percentage</td>
</tr>
<tr>
<td><strong>Total number of decisions on asylum applications</strong></td>
<td>282,726</td>
<td></td>
</tr>
<tr>
<td><strong>Total protection rate</strong></td>
<td>140,915</td>
<td>49.8%</td>
</tr>
<tr>
<td><strong>Substantive decisions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal status as refugee (Section 3 subsection 1 AsylG, Art.16a, Basic Law)</td>
<td>137,136</td>
<td>48.5%</td>
</tr>
<tr>
<td>of those recognised as entitled to asylum (Art. 16 a Basic Law and family asylum)</td>
<td>2,029</td>
<td>0.7%</td>
</tr>
<tr>
<td>Subsidiary protection (Section 4 subsection 1 AsylG)</td>
<td>1,707</td>
<td>0.6%</td>
</tr>
<tr>
<td>Ban on deportation (Section 60 subsections 5 or 7 AufenthG)</td>
<td>2,072</td>
<td>0.7%</td>
</tr>
<tr>
<td>Rejections (unfounded or manifestly unfounded)</td>
<td>91,514</td>
<td>32.4%</td>
</tr>
<tr>
<td><strong>Formal decisions</strong></td>
<td>50,297</td>
<td>17.8%</td>
</tr>
</tbody>
</table>
tion as asylum seeker or refugee, subsidiary protection and/or ban on deportation) to the total number of decisions during that same period, then the result is a total protection rate [4]. In 2015, the Office decided on 182,726 asylum applications, leading to a total protection rate of 49.8% [12]. In comparison, in 2016, the Federal Office decided on a total number of 695,733 asylum applications, resulting in a total protection rate of 62.4% [8]. Total protection rates vary greatly for different countries of origin. For people from Syria, it was 98% in 2016; for people from Albania, however, only 0.4% [9].

The majority of successful asylum applications lead people to be awarded the status of recognised refugee. Only a small number of applicants is awarded political asylum according to Germany’s Basic Law. Out of the total number of asylum seekers whose applications were decided in 2015, 48.5% received refugee status (table 1). Only 0.7% received the legal status as entitled to asylum. For 2016, the corresponding figures were 36.8% and 0.3%, respectively. However, the share of people receiving subsidiary protection increased to 22.1% in 2016 (2015: 0.6%) [8].

3.2 The distribution of asylum seekers in Germany

To a certain degree, the distribution of asylum seekers to initial reception centres in the federal states depends on accommodation capacities. Furthermore, the local branches of the Federal Office for Migration and Refugees are each responsible for particular countries of origin which means that the distribution of asylum seekers also depends on the state where a particular branch is located. Moreover, there are quotas for each federal state. These are calculated according to the Königsteiner key (Section 45 AsylG). The key regulates the distribution of asylum seekers to initial reception centres in the federal
states. The Königsteiner key is based on a federal state’s annual tax revenue and population. Since 1 November 2015, unaccompanied minors are also distributed across Germany using the Königsteiner key (in accordance with Sections 42c and 42d SGB VIII) [13]. Initially, unaccompanied minors are referred to local youth welfare offices. Later, the federal and state authorities seek accommodation for these minors near the relevant youth welfare office. If a state has already fulfilled its quota, the unaccompanied minor is brought to the closest possible state.

Figure 4 shows the distribution of asylum seekers based on the Königsteiner key for 2015. Distribution was proportional to the population of individual federal states. North Rhine-Westphalia therefore received the largest share of applicants (21.2%) and Bremen the smallest (0.9%). The distribution policy does not, however, take into account the different health and social needs of asylum seekers. A high number of people from particularly vulnerable groups such as children, the elderly and women with special needs are assigned to states with low tax revenue such as Bremen, Berlin and North Rhine-Westphalia [14].

4. Current research and findings on asylum seeker and refugee health

Representative data on the health and healthcare of asylum seekers and refugees in Germany is still lacking [2]. Compulsory examinations in accordance with Section 62 AsylG and Section 36 Infection Protection Act (IfSG) before or immediately after being admitted to an initial reception centre could prove a valuable source of data. These examinations serve to detect communicable diseases such as contagious pulmonary tuberculosis. The Robert Koch Institute has developed recommendations for minimum standards for standardised initial reception examinations in accordance with Germany’s asylum law [15]. Centres should ensure pulmonary tuberculosis screening across Germany; further examinations are at the discretion of the concerned federal state’s public health authorities. The scope and content of screening examinations therefore vary considerably between federal states [16], data is hard to compare and cannot be analysed across Germany [2]. The following picture of the health of asylum seekers and refugees can therefore only build on limited data.

4.1 Communicable diseases

Asylum seekers face the same communicable disease risks as any other people in Germany. Harsh living conditions during flight, possibly only partial immunisation, higher prevalence in the countries of origin and the cramped conditions of mass accommodation increase the vulnerability of asylum seekers to communicable diseases. Currently, the Robert Koch Institute cannot confirm that asylum seekers increase the risk of contracting communicable diseases amongst the general public [17]. The potential for outbreaks of communicable diseases, however, is a great concern in initial reception centres. An analysis of the notifications on outbreaks of communicable diseases between 2004 and 2014 in accommodation centres for asylum seekers collected based on the Infection Protection Act shows an increase
in cases [18]. Data also showed that most of those sick had contracted their condition whilst being in Germany. During the period, centres notified the Robert Koch Institute in accordance with the Infection Protection Act of 119 outbreaks involving 615 individual cases in asylum seeker accommodation centres. The most frequent disease was chickenpox (29% of cases), followed by scabies (18% of cases), measles (12% of cases), tuberculosis and rotavirus gastroenteritis (8% of cases), and other diseases (less than 5% of cases). Rarely did outbreaks spread beyond the boundaries of accommodation centres. Early vaccination, provision of information and better hygiene would have prevented most of these outbreaks [18].

Since the end of 2015, based on the data it receives according to the Infection Protection Act, the Robert Koch Institute has prepared a weekly report on the spread of communicable diseases amongst asylum seekers [19]. From calendar week 1 to calendar week 52 in 2016 (based on the data available on 18 January 2017), 6,326 cases were transmitted amongst asylum seekers. This is 1.9% of all cases of notifiable communicable diseases (329,974) in the population. Since early 2016, a small decline in the number of cases has been registered. Data on the current number of asylum seekers and their geographic distribution across Germany is incomplete, which makes it difficult to relate this figure to the ultimate number of notifications across the population. Moreover, no systematic screening for communicable diseases in the general population takes place. This makes it hard to compare incidence and prevalence among asylum seekers to other sections of the population.

Prevalence of particular communicable diseases is higher among asylum seekers than among the resident population. One good example is hepatitis B (HBV). Prevalence of the HBV surface antigen (HBsAg) as the most important indicator for a hepatitis B infection was significantly higher among asylum seekers arriving in Germany (2.3%) than among the overall population [20]. Screening programmes among asylum seekers have led to an increased detection of tuberculosis and hepatitis B and C. Only isolated cases of other imported severe communicable diseases such as relapsing fever have so far been reported [17].

With the exception of compulsory pulmonary tuberculosis examinations, screening programmes differ considerably from one federal state to the next [16, 21], leading to disparities in the prevalence of communicable diseases between different studies. A study of 102 unaccompanied minors aged 12-18 years in Bielefeld reported the high prevalence (58.8%) of communicable diseases. This was mainly due to the high rates of helicobacter pylori infections. Tuberculosis prevalence was about 1% [22]. However, the Bremen health programme reported low prevalence of communicable diseases among asylum seekers between 2001 and 2008 [23] as well as for 2011 to 2014 [24].

Gastrointestinal infections and vaccination-preventable diseases continue to be a focus. Studies reveal that asylum seeker immunisation is rarely surveyed consistently [21] and infants in particular are often only partially immunised [25]. The Standing Committee on Vaccination (STIKO) therefore recommends rapidly immunising all asylum seekers with only partial or unknown immunisation status [26]. Information on vac-
cination is currently made available in 19 languages [27]. On its website, the Robert Koch Institute provides an overview of epidemiologically relevant communicable diseases [28] and vaccination recommendations [19].

However, clear difficulties in the implementation of STIKO recommendations remain, for example concerning polio vaccination and stool screening for poliovirus following the 2013 outbreak of polio in Syria [29]. An analysis of the implementation of these recommendations by initial reception centres revealed significant differences [30]. Difficulties with implementation increased relative to the size of a centre. Centres pointed to staff shortages and language barriers as the greatest obstacles to implementation [30].

4.2 Non-communicable diseases

Non-communicable diseases such as diabetes mellitus, cardiovascular diseases, cancer, chronic respiratory diseases and mental disorders imply a high disease burden for the German population. Studies on non-communicable diseases among asylum seekers in Germany have focussed mainly on mental disorders [1].

Mental disorders

Some refugees and asylum seekers coming from regions torn by conflict or war have experienced warfare, political persecution, torture, attacks and sexual assaults before fleeing their home countries. Added to these traumatic experiences in their countries of origin are the ordeals of their long flight. Asylum seekers and refugees frequently come through various transit countries, which means their flight often takes months or even years. During this time, they not only fear for their own lives, many also lose relatives or witness the death of other refugees. Unaccompanied minors are particularly vulnerable to attacks and sexual assaults during flight [31].

Traumatic experiences can increase the risk of post-traumatic disorders [32] such as post-traumatic stress disorders, depressions, anxiety disorders, chronic pain and somatoform disorders. Post-migration stressors such as hearings, the duration of the asylum procedure, separation from closest attachment figures as well as discrimination and language difficulties are also risk factors for mental disorders [32].

Data for 104 accompanied minors from thirteen accommodation centres in Baden-Württemberg shows a high prevalence of traumatic incidents: 41.3% of these minors had witnessed physical attacks, 37.5% military conflicts, 25.0% had seen dead bodies, 15.4% had been personally physically attacked and 4.8% had been sexually abused [33]. Compared to accompanied minors, unaccompanied minors are roughly twice as likely to experience traumatic incidents. According to a study from the Netherlands, out of 1,187 accompanied minors, 23.2% had reported being physically and 8.3% sexually abused. For 1,100 unaccompanied minors, these rates were significantly higher (63.3% and 20.3% respectively). 39.3% of female and 12.1% of male unaccompanied minors had suffered sexual abuse [34].

The prevalence of post-traumatic stress disorders among accompanied and unaccompanied minors in Germany was between 14.0 and 60.0% [35, 36] and for depressions between 6.2 and 33.5% [35]. A systematic
overview of mental disorders among asylum seekers (minors and adults) shows that prevalence estimates for post-traumatic stress disorders vary widely both in institution-based samples (6.7-76.7%) and in population-based samples (16.4-54.9%) [1]. The wide divergence in prevalence has various reasons. The number of cases and methods of selecting a sample play an important role as does the composition of the sample. In addition, the heterogeneity of countries of origin and cultural backgrounds as well as the methods and measuring instruments used influence the diagnosis of post-traumatic stress disorders [1]. Especially culturally or linguistically not adapted screening and diagnostic instruments are a particularly challenging factor in detecting post-traumatic mental disorders [35]. The possibility of misdiagnoses cannot be ruled out. Prevalence among asylum seekers is however considerably higher than among the general population in Germany. Representative surveys show a lifetime prevalence of post-traumatic stress disorders among children and adolescents in Germany of 1.3% [37] and 5.4% for depressions [38].

Additionally, many asylum seekers and refugees suffer from conditions such as back pain, headaches or neck pain, which often occur together with post-traumatic stress disorders [39]. Doctors diagnosed these conditions among 16.9% [24] and 25.4% [23] of patients respectively in the accommodation centres of the Bremer health programme (Bremer Modell). This could indicate high levels of mental stress [24] and be a reaction to the stress of flight, arrival in Germany and the stress related to accommodation and the uncertainty of their prospects to settle in the country.

Further non-communicable diseases

Data on other non-communicable chronic diseases such as cancer, chronic respiratory diseases, diabetes mellitus and cardiovascular diseases also remains fragmentary [1]. One reason is that currently mainly young people (under thirty) who seldom suffer from chronic diseases are applying for asylum in Germany. A study from Bielefeld revealed the low prevalence of non-communicable chronic diseases among 102 unaccompanied minors. Asthma prevalence was 3.9%, two minors were diagnosed with lipo-metabolic disorders and severe obesity, one with an infection of the bone marrow (osteomyelitis) and one with post-polio syndrome [22].

Medical practices that migrants and refugees in the accommodation centres in Bremen can turn to on a voluntary basis based on the Bremer Modell provide data on various diseases among asylum seekers for the analysis period 2011-2014 [24]. In 29.6% of cases, ‘Factors for seeking healthcare’ were the most common reason for seeking medical consultation. These include initial medical examinations at reception without confirming a disease, provision of information on vaccination and counselling of pregnant women. Respiratory diseases were among the most frequent ICD-10 (International Classification of Diseases, 10th revision) diagnoses (18.1% of cases). Largely, this concerned acute colds that asylum seekers contracted mostly in accommodation centres. Secondly came unclear symptoms, not classified elsewhere, in particular unspecific pains without identifiable organic causes such as headaches (16.9% of cases). Thirdly came diseases of the digestive system (6.1%), which can be related to unfamiliar foods and irregular
meals as well as psychosomatic causes due to mental stress [24]. Further diagnoses included musculoskeletal and connective tissue diseases (each 6.0%) as well as diseases of the skin and hypodermis (3.6%). Acute dental problems, which were not treated before or during flight, showed a strong link to patients’ country of origin [24]. Approximately twenty percent of the 102 unaccompanied minors in Bielefeld showed tooth pathologies [22, 36]. In addition, iron-deficiency anaemia was far more frequent among unaccompanied female minors (29.2%) than unaccompanied male minors (14.1%) [22].

5. Healthcare and access to the healthcare system

Providing continuous healthcare to sick asylum seekers creates specific challenges for the German healthcare system [20]. A survey of all public health authorities revealed that interviewees felt that levels of care were inadequate for asylum seekers in Germany with mental illnesses or severe chronic diseases. Healthcare provision to the children of asylum seekers was also not evaluated as being ensured to the same degree as for unaccompanied minors [21].

Depending on federal state access to medical care is restricted to varying degrees during the first fifteen months of stay. Many stakeholders believe that this means that asylum seekers and refugees cannot expect adequate levels of care across Germany [40-42]. The text discusses the legal entitlement to healthcare, access to the German healthcare system and further related problems in more detail below.

5.1 Healthcare and the Asylum Seekers’ Benefits Act

The Asylum Seekers’ Benefits Act (AsylbLG) regulates healthcare for asylum seekers. According to Section 4 subsection 1, asylum seekers suffering from acute, treatable diseases and pain are entitled to receive healthcare services. In these cases, according to the law, ‘necessary medical or dental treatment has to be provided including medication, bandages and other services necessary for convalescence, recovery, or alleviation of disease or consequences of illnesses. Dental prostheses are only provided where for medical reasons such a measure cannot be delayed.’

Chronic conditions liable to turn acute without treatment or to lead a patient’s health to deteriorate may also be treated under the Asylum Seekers’ Benefits Act. Preventive medical check-ups and vaccinations are to be granted in every case. Pregnant women are entitled to medical and nursing care and support, midwife assistance, medications, bandages and remedies pursuant to Section 4 subsection 2 AsylbLG. All asylum seekers should be offered full immunisation early upon arrival (pursuant to Section 4 subsection 3 AsylbLG).

In addition, the law states that further benefits can be granted ‘if they are […] essential in an individual case to secure life or health’ (Section 6 subsection 1 AsylbLG). Furthermore, ‘persons who acquire a residence permit pursuant to Section 24 subsection 1 of the Residence Act (Aufenthaltsgesetz) and have special needs such as unaccompanied minors or those who have suffered torture, rape or other severe forms of physical, mental or sexual violence shall receive the medical services and other assistance they require’ (Section 6 subsection 2)
Many criticise the restrictions Sections 4 and 6 AsylbLG impose on the right of asylum seekers to receive treatment in case of illness relative to people covered by normal statutory health insurance and the implementation of these restrictions in practice [41-43]. An important point of criticism is that asylum seekers are not granted electronic patient cards. Every time they wish to see a doctor, they must apply for a voucher for medical treatment in advance from the competent authority, for example at their social welfare office. In many cases, people without the necessary medical expertise then decide on these voucher applications [41].

5.2 Healthcare on the basis of electronic health cards

After at most fifteen months, asylum seekers are entitled to full healthcare services and receive an electronic health card from a statutory health insurance scheme in accordance with book twelve of the Social Code (SGB) [40]. Nonetheless, they still do not have the same status as regular statutory health insurance members because the costs of treatment, plus a five percent administration fee, are reimbursed to insurers by social welfare offices in accordance with Section 264 of book five SGB [40].

In Germany, access to the healthcare system is not regulated at national level. In some states, asylum seekers will receive an electronic health card even before fifteen months. Since 2005, Bremen, for example, has granted such cards around three months after initial registration [23]. With few exceptions, healthcare includes the same services as those offered to regular members of statutory healthcare insurance schemes. Among the services not included are fertility treatments, disease management programmes, child benefit and maternity allowance, and medical services contracted outside of Germany. Moreover, asylum seekers will generally not have access to psychotherapy, preventive and rehabilitation care, visual aids, dental prostheses and orthodontics [44], but may be granted these after assessment in individual cases. In 2012, Hamburg also introduced the electronic health card for asylum seekers. The city has excluded services such as long-term psychotherapies, rehabilitation therapy, dental prostheses and contracting services outside of Germany [40].

In October 2015, Germany adopted the Asylverfahrensbeschleunigungsgesetz, a law to fast-track asylum applications. It makes obtaining an electronic health card easier for asylum seekers even before they have been in Germany for fifteen months. Each federal state can decide whether to apply the law or maintain the existing structures. Statutory health insurers are then required to conclude a framework agreement with that state. A pre-condition is that the agreement will apply at least at district level or for independent towns [40]. Municipalities are free to opt in to these agreements. Framework agreements define the scope of services, accounting procedures and accounting audits for services as well as the reimbursement of the costs of care and for administration incurred by insurers [40].

Since adoption of the law, Schleswig Holstein and Berlin have introduced electronic health cards for all asylum seekers, considerably lowering the barriers to the healthcare system. In North Rhine-Westphalia, 20 municipalities have so far adopted a framework agreement to ensure the provision of adequate healthcare services, early and easy access to the healthcare system should be considered.
between the federal state and municipalities. However, services remain based on Sections 4 and 6 AsylbLG, implying that asylum seekers in these states have only limited access to medical care compared to regular members of statutory healthcare [40]. Lower Saxony, the Rhineland Palatinate, Saarland, Brandenburg and Thuringia have all concluded framework agreements with statutory health insurers. Many municipalities have however not yet entered these agreements. Hesse is still negotiating with insurers and municipal umbrella organisations [45]. Bavaria, Saxony, Baden-Württemberg, Mecklenburg-Western Pomerania and Saxony-Anhalt decided not to introduce an electronic health card for asylum seekers [45].

As the available data reveals, limiting access to medical services for asylum seekers hardly helps save costs. Indeed, data from the Office for Labour, Social Affairs, Family and Integration in Hamburg indicates that equipping asylum seekers with electronic health cards could help save costs. While the average per person costs of healthcare remain the same, considerable amounts are saved that would otherwise have been spent on administrative fees [46]. A study based on data from the Federal Statistics Office of the period from 1994 to 2013 reveals that annual per capita medical services expenditure for asylum seekers with only limited access to the healthcare system are higher than for asylum seekers with full access [47]. There are, therefore, good arguments to reduce the barriers to healthcare services from statutory health insurers both from a humanitarian and an economic point of view.

5.3 Psychiatric and psychotherapeutic care

In acute cases, the Asylum Seekers’ Benefits Act also covers psychiatric care. Psychotherapy, however, is generally excluded. Psychotherapy is therefore often applied for based on Section 6 AsylbLG, which provides the possibility of at least short-term therapy. A further obstacle for psychotherapy concerns the reimbursement of the costs of interpretation during therapy sessions [32]. According to Sections 4 and 6 AsylbLG, asylum seekers still awaiting the decision over their asylum application can apply to have the costs for interpretation reimbursed from their social welfare office [48]. Minors stand the greatest chances of having these costs covered. Recognised asylum seekers and asylum seekers who have been in Germany for more than fifteen months, however, will find getting reimbursement for interpretation hard. As Germany’s Social Code books define German as the country’s official language, statutory health insurers will not cover these costs. Reimbursement for interpretation can however be applied for according to Section 73 book twelve SGB or in certain cases according to Section 53 book twelve SGB from the social welfare offices; yet these constitute discretionary benefits [35]. The lack of regulation concerning reimbursement for interpretation therefore constitutes a major barrier for access to psychotherapy [32, 35].

Psychotherapeutic treatment in Germany remains organised in specialised psychosocial treatment centres. The umbrella organisation of psychosocial centres for refugees and the victims of torture BAF (Bundesweite Arbeitsgemeinschaft der psychosozialen Zentren für Flüchtlinge und Folteropfer) is a network of 26 psycho-
social centres in Germany [49]. One quarter of patients at these centres are minors and of these approximately 45% are unaccompanied minors [49]. Limited provision and difficult access to psychotherapeutic and psychosocial facilities prevents the early treatment of often severely traumatised patients. Only very few asylum seekers therefore access therapy. According to BAff, social security offices rejected 15% of all applications for psychotherapy. In contrast, only 1 to 3% of applications by members of statutory health insurers are rejected [49].

Moreover, centres registered an imbalance between supply and demand. Each year they turn down considerably more asylum seekers than they can treat. This leads to long waiting lists and psychosocial centres only refer a mere 5% of patients to registered therapists each year [49]. In addition, early detection of asylum seekers who are under considerable mental strain and therefore at increased risk of becoming ill would require new linguistically and culturally sensitive instruments for screening and diagnosis [35]. Furthermore, there is an increasing need for professionals specially qualified and trained in psychotherapy for children and adolescents [35]. A multi-modal concept supported by interpreters that combines psychotherapy with social work, medical care and legal counselling on residence is recommended for the treatment of traumatised asylum seekers [32].

6. Discussion

The strong rise in the number of asylum seekers poses significant challenges to the German healthcare system. Initial results indicate a particular need for care concerning mental health and chronic diseases as well as for the children of asylum seekers [1, 21]. Many stakeholders therefore uphold the need to grant asylum seekers the same rights to access healthcare services as everybody else as early as possible [41, 50]. Furthermore, in the relevant literature we can identify a number of areas that many stakeholders believe require action:

- Experts broadly agree on the need to rapidly implement the recommendations of the Standing Committee on Vaccination for asylum seekers [18, 21, 26, 30]. In large reception centres, staff shortages and language barriers appear to be potential obstacles [30].
- Asylum seekers appear to have an increased need for information on issues such as vaccination and pregnancy [24]. For public health authorities, important information includes materials that provide orientation in the healthcare system, information on local contact points for health questions, vaccine-preventable diseases, sexually transmitted diseases, diet during pregnancy and shortly after birth, dental hygiene for children, mental disorders, addictive behaviour as well as tuberculosis [21].
- Mental health is a field many observers consider requires more action [31, 32, 35, 51]. Very great needs, they believe, meet with poorly developed care facilities. The lack of validated screening instruments capable of taking into account language and culture is problematic [35]. Moreover, AsylbLG limits access to therapy. The lack of qualified therapists, overstretched care facilities as well as the unclear reimbursement
of services such as interpretation remain obstacles even once therapies have been granted [32, 35, 51].

- Many experts moreover recommend providing asylum seekers with an electronic health card [41, 52]. This would help reduce administration costs and would lower the barriers for asylum seekers to access healthcare services [41]. A crucial advantage would be that asylum seekers would no longer have to apply for vouchers at social security offices in advance and doctors could decide treatments directly [41].

Recognising gaps in healthcare and care needs requires reliable information. Studies so far have frequently relied on low case numbers, been limited to certain regions and are hardly reliable [1]. Results cannot be compared due to the highly heterogeneous nature of study populations and survey instruments [1]. A lack of comparative figures for the general population also makes the classification of the health problems of asylum seekers and refugees more difficult. Generally, the data available is not sufficiently differentiated either. Asylum seekers are a highly heterogeneous population with different resources, health problems and medical needs. Current examinations do not usually differentiate between women and men, which has so far hampered a gender-sensitive analysis. Due to the great heterogeneity of this group, an approach would be desirable that differentiates between people according to their country of origin, cultural background or possible reasons for flight for example.

Health examination procedures in initial reception centres are, however, also responsible for the current lack of reliable information [2, 21]. Relevant information is not always collected and transmitted as it should be [21]. Furthermore, different federal states demand different examinations [16].

Recently, therefore, important initiatives have developed to improve information on the health of asylum seekers and refugees and promote close networking between important stakeholders. RESPOND, a project by the University Hospital of Heidelberg, which is funded by the Federal Office of Education and Research, has begun population surveys on the health and healthcare of asylum seekers in Baden Württemberg [53]. The Federal Ministry of Health also funds another initiative by the Heidelberg University Hospital to collect data on the health and healthcare of asylum seekers and refugees (Dateninitiative Gesundheit und medizinische Versorgung von Asylsuchenden und Flüchtlingen) which is considering options to standardise documentation on medical care at reception centres in the federal states [54]. The initiative aims for a rapid detection of health problems and the use of information for routine reporting and scientific analysis. The research group FlüGe – Herausforderungen und Chancen globaler Flüchtlingsmigration für die Gesundheitsversorgung in Deutschland (FlüGe – Opportunities and threats of global refugee migration to healthcare in Germany) at the University of Bielefeld is also investigating specific issues related to the health situation and healthcare of asylum seekers and refugees [55]. North Rhine-Westphalia’s Ministry for Innovation, Science and Research is funding two further projects at the University of Bielefeld to investigate the effects of providing asylum seekers with electronic health cards.
Moreover, the Robert Koch Institute is carrying out various projects in the context of infection protection. For example, syndromic surveillance in emergency shelters for asylum seekers in Berlin and the evaluation of data provided by medical care units improves treatment. Furthermore, knowledge on the prevalence of multi-resistant pathogens as well as on hepatitis and tuberculosis improved, creating a better basis to develop recommendations. In times of increased immigration and to fulfil the information requirements laid out in the Infection Protection Act earlier and better in the future, Germany has updated reporting by introducing DEMIS (Deutsches Elektronisches Meldesystem für den Infektionsschutz) – an electronic reporting system for infectious diseases.

Asylum seekers and refugees are not however the only focus of the initiatives at the Robert Koch Institute. Gaps remain in the information concerning migrants who have been living in Germany for a long time and the children of migrants who were born in Germany. For example, as part of the Robert Koch Institute’s representative population health surveys, the baseline of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS baseline survey, 2003-2006) included a proportion of children and adolescents with migration background [56]. This however does not apply to the follow-up survey KiGGS Wave 1 (2009-2012), nor to the German Health Update (GEDA) surveys and the German Health Interview and Examination Survey for Adults (DEGS1) [57].

The project funded by the Federal Ministry of Health is therefore seeking measures to improve the information base on the health of people with migration background, which aim to advance health monitoring and reporting at the Robert Koch Institute. Firstly, access methods, recruiting procedures and also the content and survey instruments will be reviewed and further developed to improve the integration of people with migration background in health monitoring. Secondly, possibilities of using routine data and micro census data as well as a socio-economic panel will be considered.

In future, these initiatives will significantly improve the information base on the health of asylum seekers and people with migration background in Germany. Based on existing experience [56, 58, 59], federal health reporting will provide important groundwork to develop a reporting concept that specifies key issues and sources of data, ensures findings are transmitted to politics and society and serves as a basis for debate in society and policy initiatives.

References
Health and healthcare provision to asylum seekers and refugees in Germany


10. Bundesamt für Migration und Flüchtlinge (BAMF) Migration nach Deutschland - sichere Herkunftsländer. BAMF, Nürnberg
http://www.bamf.de/DE/Migration/AsylFluechtlinge/Asylverfahren/BesondereVerfahren/SichereHerkunftsländer/siche-re-herkunftsländer-node.html (As at 19.01.2017)


http://www.gesundheitsamt.bremen.de/publikationen-3093#GEB%20INFO (As at 19.01.2017)


Health and healthcare provision to asylum seekers and refugees in Germany


www.hamburg.de/contentblob/4465734/data/gesundheitsversorgung-auslaender.pdf (As at 19.01.2017)


55. Universität Bielefeld, Fakultät für Gesundheitswissenschaften (o.J.) Herausforderungen und Chancen globaler Flüchtlingsmigration für die Gesundheitsversorgung in Deutschland. NRW Fortschrittskolleg: www.uni-bielefeld.de/gesundhw/ag2/fluege_nrw/ (As at 19.01.2017)


Imprint

Journal of Health Monitoring

Author details
Robert Koch Institute, Department Epidemiology and Health Monitoring and Department Infectious Disease Epidemiology, Berlin
Bielefeld University, Faculty of Health Sciences
Heidelberg University Hospital, Department of General Practice and Health Services Research
Charité-Universitätsmedizin Berlin, Institute of Medical Sociology and Rehabilitation Science

Corresponding author
Laura Frank
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin, Germany
E-mail: FrankL@rki.de

Conflicts of interest
The authors declared no conflicts of interest.

Publisher
Robert Koch Institute
Nordufer 20
D-13353 Berlin, Germany

Editors
Dr. Franziska Prütz, Martina Rabenberg, Alexander Rommel, Dr. Anke-Christine Saß, Stefanie Seeling, Martin Thißen, Dr. Thomas Ziese
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Gisela Dugnus, Alexander Krönke, Kerstin Möllerke

Please cite this publication as
DOI 10.17886/RKI-GBE-2017-021
ISSN 2511-2708

The Robert Koch Institute is a Federal Institute within the portfolio of the German Federal Ministry of Health
12-Month prevalence of known diabetes mellitus in Germany

Abstract
Diabetes mellitus is a metabolic disease involving chronic dysfunction of blood sugar regulation; if left untreated, it can result in serious secondary illnesses. In 2014 and 2015, a total of 7.0% of women and 8.6% of men in Germany with an age of 18 and over reported having diabetes mellitus in the past 12 months (these figures do not include gestational diabetes). There are significant differences in the 12-month prevalence among adults: the prevalence of known diabetes increases significantly with age, and is particularly high among people with a low educational status and those living in Saxony-Anhalt or Brandenburg. The Robert Koch Institute is currently developing a diabetes surveillance system in order to establish a data-based fundament for guiding health policy decisions in Germany.

Introduction
Diabetes mellitus is a metabolic disorder that involves a dysfunction of blood glucose regulation [1]. It can cause chronically elevated blood sugar concentrations, which, if left untreated, can damage blood vessels and nerves. In turn, these disorders increase the risk of concomitant diseases and secondary illnesses such as heart attacks, strokes, renal dysfunction, retinal damage and diabetic foot syndrome [2]. Diabetes also reduces a person’s quality of life and life expectancy [3, 4]. Further, it results in high direct and indirect costs to the health system due to the expenses incurred through diabetes care and treatment as well as through the loss of resources associated with incapacities to work or forced early retirement [5].

The most important forms of diabetes are type 1, type 2 and gestational diabetes [6]. Type 1 diabetes is an autoimmune disease and mainly develops during childhood or adolescence. Type 2 diabetes is the most common form and usually affects adults over the age of 40. Alongside a genetic predisposition, the main risk factors linked to type 2 diabetes are an unfavourable diet, a lack of exercise, and the resulting overweight. Gestational diabetes normally only exists during pregnancy; however, it is linked to an increased risk of type 2 diabetes in older age [7].

Indicator
The 12-month prevalence of diabetes mellitus for GEDA 2014/2015–EHIS was assessed using a self-administered paper-based or online questionnaire. The study posed the question ‘During the past 12 months, have you had any of the following diseases or conditions?’ This question was followed by a list of diseases that also included ‘diabetes (not including gestational diabetes)’. Thus, the study excludes gestational diabetes. However, it is not possible to differentiate between type 1 and type 2 diabetes in the results.
The present analysis is based on data provided by 23,345 participants aged 18 and above from the GEDA 2014/2015-EHIS study who also provided information about their 12-month prevalence of diabetes (671 participants were excluded from the analysis as this data was lacking). The analysis was conducted using a weighting factor that corrects for deviations within the sample from the population structure for gender and age within Germany’s federal states (as of 31 December 2014) as well as for municipality type and level of education. The article entitled German Health Update: New data for Germany and Europe [8], which is also published in this issue, sets out the details of the methodology employed for GEDA 2014/2015-EHIS. Educational status was defined in accordance with the International Standard Classification of Education (ISCED) [9]. P-values of <0.05 were considered statistically significant.

Results and discussion

In GEDA 2014/2015-EHIS, 7.7% of participants aged 18 or above reported the presence of a diabetes mellitus (not including gestational diabetes) during the last 12 months (see Table 1). The prevalence was lower among women with 7.0% than among men with 8.6%.

The last telephone survey conducted by the Robert Koch Institute of adults aged 18 or over was undertaken...
in 2012 (GEDA 2012). This study found a comparable 12-month prevalence (7.7% overall) to that of GEDA 2014/2015-EHIS [10]. However, a comparison of gender-specific prevalence demonstrates small deviations in opposite directions. The 12-month prevalence derived from the GEDA 2012 data is slightly higher among women (7.5%) and slightly lower among men (7.9%) than the prevalence estimated by the current GEDA 2014/2015-EHIS data [10]. These variations are probably mostly due to the different questions posed by the studies. In GEDA 2012 respondents were asked whether they ever had a physician-diagnosed diabetes, which sustained during the preceding 12 months; this could explain the lower prevalence. However, the question did not exclude gestational diabetes; this could explain the higher prevalence of diabetes only among women. Data from the German Health Interview and Examination Study for Adults (DEGS1, 2008-2011) provides an indication of the degree of gestational diabetes occurring among women: the study found a prevalence of physician-diagnosed diabetes which had only occurred during pregnancy in women between 18 and 79 years of age of 1.2%. This corresponds to 16.3% of the lifetime prevalence of diabetes in women [11].

With respect to changes over time, a significant increase in lifetime prevalence of physician-diagnosed diabetes in adults of 18 and above is evident from the telephone surveys conducted in 2003 (GSTel03) compared with 2009 (GEDA 2009). During this time, the prevalence increased from 6.8% to 9.3% in women and from 5.4% to 8.2% in men [10, 12]. Similarly, a comparison of the examination surveys conducted between 1997 and 1999 (GNHIES98) and between 2008 and 2011 (DEGS1) demonstrates a significant increase in the lifetime prevalence of physician-diagnosed diabetes among 18- to 79-year-olds [11]. In addition, data from statutory health insurers also indicate an increased prevalence of diagnosed diabetes between 2000 and 2010 [13-15]. In contrast, no other relevant changes in prevalence were observed based on the telephone surveys conducted between 2009 and 2012 (GEDA 2009, GEDA 2010 and GEDA 2012). A slight trend towards an increased lifetime and 12-month prevalence was observed among men between 2009 and 2012; however, this trend in men was not statistically significant, nor was it observed in women (lifetime prevalence: 8.2%, 8.5%, 8.7% for men, 9.3%, 8.8%, 9.0% for women [10]; 12-month prevalence: 7.2%, 7.6%, 7.9% for men, 7.5%, 7.1%, 7.5% for women [10, 16, 17]).

Several factors need to be taken into account when interpreting these temporal developments in the prevalence of known diabetes. First, up to about one third of the increase in prevalence that occurred within the time period between 2000 and 2010 can be explained by population aging [11-13]. However, even after aging has been accounted for, the increase in known diabetes remains statistically significant [11, 12]. Second, the increase could also partially be explained by earlier diabetes diagnosis resulting from a stronger focus on diabetes among medical staff (such as since the introduction of the Disease Management Program for type 2 diabetes) [18]) or changes to diagnostic criteria [19, 20]. This would cause the proportion of diagnosed cases to rise, and the share of undetected cases to fall. The recently observed
Men and women in Saxony-Anhalt and Brandenburg have a significantly higher 12-month prevalence of known diabetes compared to the average prevalence over all federal states in Germany.

Fig. 1
12-month prevalence of known diabetes (not including gestational diabetes) in women and men according to German federal state (N=23,345)
Source: GEDA 2014/2015-EHIS

95% confidence interval in parentheses

12-Month prevalence of known diabetes mellitus in Germany

A decrease in the prevalence of undiagnosed diabetes suggests that improvements may have resulted in an earlier detection of diabetes [21]. Third, improved care for people with diabetes (such as since the introduction of the Disease Management Program [18] and the module for the German National Disease Management Guideline (NDMG) on type 2 diabetes [22]) and the associated longer survival could also contribute to the increased prevalence of diagnosed diabetes. The increased proportions of 45- to 79-year-olds who are affected by dia-
After the age of 45, the 12-month prevalence for known diabetes rises dramatically with increasing age among both men and women.

Diabetes but who have achieved their therapy goal with regard to the laboratory parameter HbA1c, who self-monitor their blood-glucose level or who have had annual eye and foot examination suggest that diabetes care has at least partly improved [23]. Finally, the temporal developments in behavioural risk factors continue to play a role in the dynamics of diabetes prevalence. However, diverging temporal trends have been observed for single risk factors what complicates the evaluation of changes in the overall diabetes risk. For example, the prevalence of physical inactivity decreased, whereas the prevalence of obesity increased [24, 25].

Analyses of the GEDA 2014/2015-EHIS data stratified according to age and level of education reveal significant differences in the 12-month prevalence of known diabetes among the adult population in Germany. The 12-month prevalence for men and women under 45 is no more than 2.0%; however, the prevalence rises strongly with age to 5.2% among women and 9.3% among men of 45 to 64 years of age, and to 17.6% among women and 21.1% among men of 65 and above. Moreover, men and women with a lower level of education are more likely to have known diabetes than those with a higher level of education. Whereas this difference is pronounced among women of all ages, it does not occur among men until the 45-to-64 age group (see Table 1). Similarly, a significantly higher prevalence of undetected diabetes was also observed with increasing age and lower educational status [21, 26].

Compared to the average 12-month prevalence of known diabetes over all federal states, significantly higher prevalence estimates were observed among women in Saxony-Anhalt, Brandenburg, Thuringia and Saarland, and among men in Saxony-Anhalt, Brandenburg and Rhineland-Palatinate (see Figure 1). In contrast, women in Bremen, Schleswig-Holstein, Hessen, Baden-Württemberg and Bavaria, and men in Hamburg and Baden-Württemberg have significantly lower prevalence estimates compared to the national average. Even after the differences in age structure and educational status between the German federal states have been taken into account, most of the deviations from the national average remain (with the exception of men in Rhineland-Palatinate, Hamburg and Baden-Württemberg). Similar regional patterns were identified for the prevalence of physician-diagnosed diabetes by a pooled analysis of GEDA data from 2009, 2010 and 2012 and for the prevalence of diagnosed type 2 diabetes in an analysis of AOK health insurance data from 2010 [27, 28]. Nevertheless, it is important to remember that the prevalence of known diabetes may also differ considerably within a federal state [14, 29]. The comparison of EHIS data at the European level that was undertaken for the OECD/EU report 'Health at a Glance: Europe 2016' as well as for the article Health monitoring and health indicators in Europe that is also published in this issue shows that the 12-month prevalence of known diabetes in Germany is similar to the European average [30, 31]. When interpreting the different prevalence levels of known diabetes within Germany and Europe, alongside differences in age structure, differences in factors mentioned above such as the relation of diagnosed cases to undetected cases, the diabetes care situation, and risk factor load again need to be taken into account.
In summary, diabetes mellitus is a frequent disease among the adult German population with a particular high prevalence among women and men with an age of 45 or above, with a lower level of education, and from Saxony-Anhalt and Brandenburg. These population groups need to be more strongly targeted by measures aimed at prevention, early detection and care. The Robert Koch Institute is developing a diabetes surveillance system in order to establish a sustainable diabetes reporting and a data-driven basis for guiding health-policy decisions in Germany. This includes the definition of suitable indicators for tracking the risk factors and the burden associated with diabetes as well as the identification of existing barriers to data usage and of data gaps. Concept and current status of the diabetes surveillance system are described in detail in a Concepts & Methods article published in this issue [32].

References

Adults with a lower level of education more frequently reported having diabetes in the last 12 months than adults with a higher level of education.


12-Month prevalence of hypertension in Germany

Abstract
Hypertension is among the most important risk factors for cardiovascular diseases and therefore a significant determinant of the most frequent causes of death in adults. According to the GEDA 2014/2015-EHIS survey nearly one in three adults in Germany have self-reported physician-diagnosed hypertension. Men are affected more in the age group of under 65 years old. Nearly two thirds of all men and women aged 65 and over have hypertension. An educational gradient is particularly evident among women, with a higher prevalence of self-reported hypertension among women with low levels of education. Compared to the German average, prevalence of self-reported hypertension among men is higher in Mecklenburg-Western Pomerania and Saxony-Anhalt and among women in all East German federal states with the exception of Berlin. Only in Bremen is the prevalence among men lower than the national average.

Introduction
Hypertension is among the most important risk factors for cardiovascular diseases and therefore a significant determinant of the most frequent causes of death in adults. Hypertension is mostly due to a combination of genetic predispositions, age, gender and various unhealthy diet and living conditions such as excess weight, high salt intake, high alcohol consumption, lack of exercise and stress. Only rarely is hypertension the result of other diseases. Hypertension is, however, a risk factor that patients can significantly influence through lifestyle changes and consistent drug therapy [1].

Indicator
For the GEDA 2014/2015-EHIS survey, participants were asked to answer three standardised questions on hypertension either online or in writing. The survey defined people who responded that their doctor had diagnosed them at least once with hypertension and who confirmed that they had either suffered from hypertension during the past twelve months or were currently taking medicines to reduce blood pressure as people with self-reported physician-diagnosed hypertension during the past twelve months. Blood pressure values were not surveyed.

The analysis is based on the answers given by 23,967 participants aged eighteen and over (49 participants were excluded on grounds that they failed to fill in all the required fields). Answers were adjusted to account for differences between sample structure and the overall German population (on 31 December 2014) with regard to gender, age, type of community and levels of education. Education levels were defined using a standardised
12-Month prevalence of hypertension in Germany

procedure (International Standard Classification of Education, ISCED) that takes into account educational and professional qualifications [2]. A detailed description of the methodology used by GEDA 2014/2015-EHIS can be found in the article ‘German Health Update – new data for Germany and Europe’ [3] in this issue.

Results and discussion

According to the GEDA 2014/2015-EHIS survey results, nearly one in three adults (30.9% of women and 32.8% of men) have self-reported, physician-diagnosed hypertension (table 1). Prevalence of self-reported hypertension increases with age. Nearly two thirds of those aged 65 and over (63.8% of women and 65.1% of men) have self-reported hypertension.

An association between self-reported hypertension and education exists for women of all age groups. Women in the high education group are significantly less likely to report physician-diagnosed hypertension than women from the low education group. For men, a similar association exists for those aged between 45 and 64.

Split by regions, prevalence of self-reported hypertension is higher among men in Mecklenburg-Western Pomerania and Saxony-Anhalt and among women in all East German federal states with the exception of Berlin compared with the national average. Prevalence

<table>
<thead>
<tr>
<th>Women</th>
<th>%</th>
<th>(95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women total</td>
<td>30.9</td>
<td>(29.8-32.1)</td>
</tr>
<tr>
<td>18 – 29 Years</td>
<td>4.2</td>
<td>(3.1-5.6)</td>
</tr>
<tr>
<td>Low education</td>
<td>6.5</td>
<td>(3.9-10.5)</td>
</tr>
<tr>
<td>Medium education</td>
<td>4.0</td>
<td>(2.7-5.8)</td>
</tr>
<tr>
<td>High education</td>
<td>1.4</td>
<td>(0.7-3.0)</td>
</tr>
<tr>
<td>30 – 44 Years</td>
<td>9.0</td>
<td>(7.8-10.4)</td>
</tr>
<tr>
<td>Low education</td>
<td>12.3</td>
<td>(8.2-18.0)</td>
</tr>
<tr>
<td>Medium education</td>
<td>9.6</td>
<td>(8.0-11.4)</td>
</tr>
<tr>
<td>High education</td>
<td>5.6</td>
<td>(4.3-7.3)</td>
</tr>
<tr>
<td>45 – 64 Years</td>
<td>31.6</td>
<td>(29.9-33.5)</td>
</tr>
<tr>
<td>Low education</td>
<td>37.4</td>
<td>(33.1-41.8)</td>
</tr>
<tr>
<td>Medium education</td>
<td>32.0</td>
<td>(29.7-34.3)</td>
</tr>
<tr>
<td>High education</td>
<td>25.4</td>
<td>(22.8-28.2)</td>
</tr>
<tr>
<td>≥ 65 Years</td>
<td>63.8</td>
<td>(61.5-66.1)</td>
</tr>
<tr>
<td>Low education</td>
<td>66.4</td>
<td>(62.8-69.9)</td>
</tr>
<tr>
<td>Medium education</td>
<td>62.9</td>
<td>(59.4-66.2)</td>
</tr>
<tr>
<td>High education</td>
<td>58.0</td>
<td>(53.4-62.4)</td>
</tr>
<tr>
<td>Total (women and men)</td>
<td>31.8</td>
<td>(31.0-32.7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Men</th>
<th>%</th>
<th>(95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men total</td>
<td>32.8</td>
<td>(31.6-33.9)</td>
</tr>
<tr>
<td>18 – 29 Years</td>
<td>4.4</td>
<td>(3.3-6.0)</td>
</tr>
<tr>
<td>Low education</td>
<td>5.4</td>
<td>(3.2-8.9)</td>
</tr>
<tr>
<td>Medium education</td>
<td>4.5</td>
<td>(3.1-6.6)</td>
</tr>
<tr>
<td>High education</td>
<td>2.3</td>
<td>(1.0-5.2)</td>
</tr>
<tr>
<td>30 – 44 Years</td>
<td>14.5</td>
<td>(12.8-16.5)</td>
</tr>
<tr>
<td>Low education</td>
<td>12.7</td>
<td>(8.5-18.5)</td>
</tr>
<tr>
<td>Medium education</td>
<td>17.5</td>
<td>(14.9-20.3)</td>
</tr>
<tr>
<td>High education</td>
<td>9.9</td>
<td>(7.9-12.2)</td>
</tr>
<tr>
<td>45 – 64 Years</td>
<td>38.3</td>
<td>(36.4-40.1)</td>
</tr>
<tr>
<td>Low education</td>
<td>42.7</td>
<td>(37.9-47.7)</td>
</tr>
<tr>
<td>Medium education</td>
<td>40.1</td>
<td>(37.4-42.8)</td>
</tr>
<tr>
<td>High education</td>
<td>33.5</td>
<td>(30.9-36.2)</td>
</tr>
<tr>
<td>≥ 65 Years</td>
<td>65.1</td>
<td>(62.9-67.1)</td>
</tr>
<tr>
<td>Low education</td>
<td>65.5</td>
<td>(60.5-70.3)</td>
</tr>
<tr>
<td>Medium education</td>
<td>65.2</td>
<td>(61.9-68.4)</td>
</tr>
<tr>
<td>High education</td>
<td>64.5</td>
<td>(61.4-67.5)</td>
</tr>
<tr>
<td>Total (women and men)</td>
<td>31.8</td>
<td>(31.0-32.7)</td>
</tr>
</tbody>
</table>

Table 1

12-month prevalence of self-reported, physician-diagnosed hypertension according to gender, age and educational status (n=23,967)

Source: GEDA 2014/2015-EHIS

GEDA 2014/2015-EHIS

Data holder: Robert Koch Institute
Aims: to provide reliable information about the population’s health status, health-related behaviour and health care in Germany, with the possibility of a European comparison
Method: questionnaires completed on paper or online
Population: people aged 18 years and above with permanent residency in Germany
Sampling: registry office sample; randomly selected individuals from 301 communities in Germany were invited to participate
Participants: 24,016 people (10,872 men; 13,144 women)
Response rate: 26.9%
Study period: November 2014 – July 2015
Data protection: all participants were informed about the study’s aims and content and about data protection, and provided their informed consent

More information is available at www.geda-studie.de

CI=Confidence interval
12-Month prevalence of hypertension in Germany

Among men is lower than the German average in Bremen (figure 1).

Population-wide examination surveys to collect standardised blood pressure measurements are expensive and require considerable efforts, which is why they are conducted only at larger intervals. Interview surveys such as GEDA 2014/2015-EHIS, however, can be conducted at shorter intervals and show the prevalence of self-reported hypertension. Yet the fact of being self-reported depends decisively on three factors: people’s awareness of hypertension (which can only be determined through examination surveys); prevalence of hypertension in the

According to the GEDA 2014/2015-EHIS survey nearly one in three adults in Germany have self-reported physician-diagnosed hypertension.

Fig. 1 12-month prevalence of self-reported, physician-diagnosed hypertension among women and men according to German federal state
Source: GEDA 2014/2015-EHIS

95% confidence interval in parentheses
The prevalence of self-reported hypertension increases with age. Nearly two thirds of people aged 65 and over have been diagnosed with hypertension.

population (including undetected hypertension); as well as the methodological particularities of such a survey (in particular the operationalisation of the term hypertension and the information provided on the drug treatment of hypertension, as patients with controlled hypertension are likely to answer that they do not suffer from hypertension).

According to the results of the last national examination survey, the German Health Interview and Examination Study for Adults (DEGS1, 2008–2011), over 80% of participants with hypertension were aware of the condition. Awareness was greater among women than men (86.8% and 78.3% respectively) and higher among older than among younger adults [4]. Prevalence in GEDA 2014/2015-EHIS of self-reported hypertension is higher than the prevalence of known hypertension in DEGS1 2008-2011 [4]. DEGS1 prevalences, however, refer only to adults up to 79 years. In addition, the DEGS1 definition of known hypertension required not only self-reported physician-diagnosed hypertension but also hypertensive blood pressure values or the intake of antihypertensive medication. Moreover, DEGS1 measures point prevalence, whereas prevalence in GEDA 2014/2015-EHIS is the twelve-month prevalence. An increase in the prevalence of hypertension is unlikely, as data from numerous surveys reveals a continuous and consistent decrease in blood pressure levels in Germany and Western Europe in general over the past two decades [1, 4-6].

Compared to GEDA 2012 results [7], the twelve-month prevalence of self-reported physician-diagnosed hypertension is slightly higher in GEDA 2014/2015-EHIS. This is potentially due to methodological differences between the two surveys. Whereas both studies defined the indicator similarly as regards taking into account the medicines patients were given and how the indicator was limited to only cases of physician-diagnosed hypertension, the wording and order of questions in the two studies were different so that the surveys are not fully comparable.

The indicator for self-reported hypertension analysed here consists of three questions on hypertension. It expands and more precisely defines the simple self-reporting of hypertension during the past twelve months, as collected by the European Health Interview Survey (EHIS). This ensured that 621 participants (2.5% of those surveyed), who answered that they had not suffered from hypertension during the past twelve months, were nonetheless assigned to the correct category, as they also stated that they had in the past been diagnosed with hypertension by a physician and were currently taking medicines to control their blood pressure. These appear to be cases of controlled hypertension where patients no longer consider themselves as having hypertension. A more specific question seems desirable that asks whether hypertension was (ever) diagnosed by a physician because interviews do not define the term hypertension and participants’ answers are therefore subject to multiple influences that cannot be further determined.

The greater prevalence of self-reported hypertension observed in some East German federal states matches results from the DEGS1 survey [8]. It should be noted that the positive developments in north-eastern Germany, which have led to greater awareness, more frequent treat-
ment and better control of hypertension [1], cannot be demonstrated with the indicator self-reported hypertension in GEDA 2014/2015-EHIS (since higher awareness increases the prevalence of self-reported hypertension while better treatment and control help reduce the risk in the population, however, have no influence on the prevalence of self-reported hypertension).

Higher prevalence of self-reported hypertension among women with lower levels of education is in accordance with GEDA-2012 results [7], as well as with DEGS1 findings of an association between the prevalence of hypertension and socioeconomic status [9]. Analyses based on DEGS1 data, however, reveal that people’s socioeconomic status has no influence on hypertension awareness, treatment or control.

Overall, there is a lack of nationwide population-based data on blood pressure in Germany [1]. In the intervals between examination surveys, monitoring self-reported hypertension through interview surveys such as GEDA 2014/2015-EHIS can detect current trends in self-reported hypertension. However, because of the limited validity of self-reported hypertension in interview surveys, it will require standardised blood pressure measurements and an operational and reproducible definition of hypertension to confirm these trends [10]. Increasing validity by including information on medicines and limiting the category to physician-diagnosed hypertension should be discussed when further developing EHIS indicators that currently use only self-reported hypertension in the past twelve months as an indicator for hypertension.

A comprehensive comparison of the blood pressure situation in Germany and between European countries, however, requires an analysis of different blood pressure indicators, including not only data from interviews but also standardised measurements of mean systolic and diastolic blood pressure to determine the prevalence of known and undetected hypertension as well as data on the degree of awareness, treatment and control of hypertension. A simple cross-country comparison of self-reported hypertension during the past twelve months (the current EHIS indicator for hypertension, as described in the article ‘Health monitoring and health indicators in Europe’ [11] in this issue, which does not take into account whether a person is taking medicines to lower blood pressure and that does not limit the sample to people with physician-diagnosed hypertension) reveals great differences between countries, possibly mainly grounded in methodology. It was therefore proposed to expand and better define the current EHIS indicator. Current international and systematic reviews based on examination surveys [6, 12] show a comparatively high prevalence of hypertension in Germany despite the high rate of controlled hypertension and the decrease in mean blood pressure in the population. These international analyses show that monitoring blood pressure at the population level is complex. In Germany, a consortium has conducted a comprehensive analysis of blood pressure with data of the Robert Koch Institute’s federal health monitoring as well as data from population-based regional surveys. These analyses should be continued [1].

Women with higher levels of education are significantly less likely to report physician-diagnosed hypertension than women with lower levels of education. A similar association exists for men aged between 45 and 64 years.
12-Month prevalence of hypertension in Germany

References


Compared to the German average, prevalence of self-reported hypertension is higher among men from Mecklenburg-Western Pomerania and Saxony-Anhalt, and higher among women in all East German federal states with the exception of Berlin.
12-Month prevalence of coronary heart disease in Germany

Abstract
The results of the GEDA 2014/2015-EHIS study demonstrate that during the last 12 months, 3.7% of women and 6.0% of men in Germany had coronary heart disease (CHD – defined as myocardial infarction, chronic consequences of myocardial infarction or angina pectoris). The 12-month prevalence of CHD in men and women under 45 years of age is well below 1.0%; however, the prevalence rises rapidly and disproportionately up to 16.0% among women and 24.1% among men aged 75 years and over. Women with a low level of education have a considerably higher prevalence of CHD (7.3%) compared to those with a high level of education (1.2%). Men show fewer education-related differences (6.5% versus 5.2%). As the indicators analysed here were first deployed as part of the 2014/2015 European Health Interview Survey (EHIS), no comparative data is available.

Introduction
Coronary heart disease or ischemic heart disease (CHD) is a chronic disease of the heart in which atherosclerosis leads to progressive narrowing of the coronary arteries. This results in reduced supply of blood to the heart muscle [1]. Angina pectoris (chest tightness) is a frequent symptom in an advanced stage and is characterised by sudden pain behind the sternum. Common complications of CHD include myocardial infarction (heart attack), heart failure and arrhythmia, all of which are associated with a high mortality rate and significant deterioration to health.

CHD is the leading cause of death in Germany and throughout the world [1, 2]; it also results in high costs to health care systems [3, 4]. The rate of new cases (incidence rate) and the mortality of CHD have been falling continuously in Germany for several decades [1]. This is most likely due to improvements in health-related behaviour (people refraining from smoking, increasing their level of physical activity and eating a balanced diet), in cardiometabolic risk profiles (high blood pressure, blood sugar levels, lipid metabolism) [5] and in the care provided to people with acute myocardial infarction [6]. Changes to the mortality rate or the incidence rate also affect the frequency of coronary heart disease found in the population (the prevalence of CHD). In addition, changes to the structure of the population, such as an increased proportion of older people due to demographic change, can also cause a numerical increase in CHD [1]. Therefore, it is essential that the age and gender-specific prevalence be regularly assessed in order to promptly identify positive and negative trends in CHD in the population, and to determine the potential for prevention and the population’s need for medical care.
Two indicators have been introduced into European health monitoring that can be used to measure the frequency of myocardial infarction and its chronic consequences, as well as chronic CHD or angina pectoris, in EU countries over time [7]. These indicators were measured in Germany for the first time as part of the German Health Update (GEDA) 2014/2015 study, which was conducted by the Robert Koch Institute within the framework of the European Health Interview Survey (EHIS) 2014/2015 [8]. More detailed information about health monitoring and health indicators in Europe can be found in a Focus article published in this issue [9].

Indicator

In order to collect data on numerous disorders and conditions, the GEDA 2014/2015-EHIS study posed the question ‘During the past 12 months, have you had any of the following diseases or conditions?’ This question was followed by a list of illnesses; this enabled information to be collected about ‘myocardial infarction (heart attack)’, ‘chronic consequences of myocardial infarction’ and ‘coronary heart disease or angina pectoris’ in the past 12 months. Participants were able to complete the GEDA 2014/2015-EHIS questionnaire on paper or online. The two indicators from European health monitoring used in the analyses presented here were defined as 1) the presence of a myocardial infarction or chronic consequences of a myocardial infarction in the last 12 months, and 2) the presence of coronary heart disease/angina pectoris in the last 12 months [7]. Since myocardial infarction and chronic CHD/angina pectoris are ultimately manifestations of the same disease of the coronary arteries, and because there are major overlaps between the two health problems, the two EHIS indicators are summarised in the following as CHD. Defining CHD as either myocardial infarction or other forms of coronary heart disease is established practice in international health reporting [1, 3, 10-12].

The following analyses are based on data from 22,639 respondents aged 18 years and above after 1,377 respondents (5.7% of the total sample) were excluded from the analyses because valid information covering their 12-month prevalence of myocardial infarction or chronic consequences of myocardial infarction and coronary heart disease/angina pectoris was missing. All analyses were carried out using a weighting factor that corrected for deviations in the sample from the population structure (as of 31 December 2014) in terms of gender, age, municipality type and level of education. The International Standard Classification of Education (ISCED) was used to ensure that the data gathered from the participants on education was comparable [13]. A detailed description of the methodology applied in GEDA 2014/15-EHIS can be found in the article German Health Update – new data for Germany and Europe [8], which is published in this issue.

Results and discussion

Over the last 12 months, a total of 3.7% of women and 6.0% of men suffered from coronary heart disease (CHD; defined as a myocardial infarction, chronic consequences of myocardial infarction, or angina pectoris – see Table 1). The 12-month prevalence of coronary heart disease in people under 45 years is well below than 1%;
In the last 12 months, 3.7% of women and 6.0% of men in Germany suffered from coronary heart disease (CHD – defined as myocardial infarction, chronic consequences of myocardial infarction or angina pectoris).

Table 1

12-month prevalence of coronary heart disease (myocardial infarction, chronic consequences of myocardial infarction or chronic coronary heart disease/angina pectoris) by gender, age and educational status (n=22,639)

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th>%</th>
<th>(95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women total</strong></td>
<td>3.7</td>
<td>(3.3-4.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 – 44 years</td>
<td>0.2</td>
<td>(0.1-0.4)</td>
<td></td>
</tr>
<tr>
<td>45 – 54 years</td>
<td>0.9</td>
<td>(0.6-1.5)</td>
<td></td>
</tr>
<tr>
<td>55 – 64 years</td>
<td>3.4</td>
<td>(2.5-4.6)</td>
<td></td>
</tr>
<tr>
<td>65 – 74 years</td>
<td>7.1</td>
<td>(5.6-8.8)</td>
<td></td>
</tr>
<tr>
<td>≥75 years</td>
<td>16.0</td>
<td>(13.3-19.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>7.3</td>
<td>(6.1-8.7)</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>3.1</td>
<td>(2.5-3.7)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1.2</td>
<td>(0.8-1.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Total (women and men)</strong></td>
<td>4.8</td>
<td>(4.5-5.2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>%</th>
<th>(95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men total</strong></td>
<td>6.0</td>
<td>(5.5-6.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 – 44 years</td>
<td>0.4</td>
<td>(0.2-0.7)</td>
<td></td>
</tr>
<tr>
<td>45 – 54 years</td>
<td>3.4</td>
<td>(2.5-4.6)</td>
<td></td>
</tr>
<tr>
<td>55 – 64 years</td>
<td>7.7</td>
<td>(6.2-9.4)</td>
<td></td>
</tr>
<tr>
<td>65 – 74 years</td>
<td>13.0</td>
<td>(11.2-15.0)</td>
<td></td>
</tr>
<tr>
<td>≥75 years</td>
<td>24.1</td>
<td>(21.1-27.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>6.5</td>
<td>(5.3-8.0)</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>3.1</td>
<td>(2.5-3.7)</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1.2</td>
<td>(0.8-1.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Total (women and men)</strong></td>
<td>4.8</td>
<td>(4.5-5.2)</td>
<td></td>
</tr>
</tbody>
</table>

CI=Confidence interval

However, it increases disproportionately to 16.0% in women and 24.1% in men aged over 75. Women with a low level of education report considerably more often that they had CHD in the last 12 months (7.3%) compared to women with a high level of education (1.2%). Men show fewer education-related differences (6.5% versus 5.2%).

The indicators described here stem from European health monitoring [1, 11, 12, 14]. The results for the aggregated CHD indicator confirm the known correlation between CHD and increasing age, male gender and lower socioeconomic status among adults in Germany [1, 14]. A comparison to the rest of Europe demonstrates a very low level of variability in the 12-month prevalence of myocardial infarction and its chronic consequences or coronary heart disease between the EU member states [9].

A direct comparison of prevalences for the new EHIS indicators with other epidemiological data is only possible to a limited extent. There are a number of methodological reasons for this. On the one hand, the EHIS study measured myocardial infarction together with chronic consequences of myocardial infarction. Consequently, the EHIS study for the first time uses a mixed indicator that is more strongly influenced by the participants’ subjective perceptions, which are also likely to be affected by their education, gender and other factors. On the other hand, the EHIS study did not ask directly whether an illness had been diagnosed by a physician; doing so is standard practice in international health surveys [11, 12, 14]. Therefore, it is highly likely that the participants’ subjective perceptions and patterns of interpretation affected the level of prevalence identified by the EHIS study more strongly than is usually the case.

In addition, epidemiological studies and health reporting [1, 11, 12, 14] normally study lifetime prevalence.
The 12-month prevalence of CHD rises disproportionately with age to approximately 16% among women and 24% among men aged 75 years and above.

Women with a low level of education reported considerably more often that they had CHD compared to women with a high level of education. Men show fewer education-related differences.

The questionnaire used in the EHIS study was developed through an extensive process of consultation undertaken between the 28 European countries [7-9]. With regard to the questions posed about chronic diseases, the decision was taken to record perceived illnesses instead of the usual focus on physician-diagnosed diseases. Moreover, in the case of myocardial infarction and stroke, chronic consequences of the diseases were also measured. This decision was taken because the results it would provide were viewed as of higher public health relevance than would have otherwise been the case. This decision was also based on the assumption that results would be less strongly influenced by regional care differences [7, 9, 15]. Furthermore, the 12-month prevalence was measured in order to demonstrate the current extent of the disease and to reduce recall bias in data collection [7, 9, 15]. The methodological difficulties described above and the lack of comparability with other data sources suggest that it is unlikely that the EHIS indicators measuring myocardial infarction und coronary heart disease, as well as the indicators for stroke (compare Fact sheet on stroke in this issue [15]), will be applied in other studies.

Despite these limitations, the new EHIS indicators are still of value for harmonised, indicator-supported health monitoring in the EU. Moreover, they can help to identify regional inequalities, positive and negative trends and the potential for disease prevention in European populations as well as to demonstrate the areas of public health in which action needs to be taken.

References


12-Month prevalence of coronary heart disease in Germany

Imprint

Journal of Health Monitoring

Author details
Robert Koch Institute
Department for Epidemiology and Health Monitoring,
Berlin, Germany

Corresponding author
Dr. Markus A. Busch
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin, Germany
E-mail: BuschM@rki.de

Conflicts of interest
The authors declared no conflicts of interest.

Publisher
Robert Koch Institute
Nordufer 20
D-13353 Berlin, Germany

Editors
Dr. Franziska Prütz, Martina Rabenberg,
Alexander Rommel, Dr. Anke-Christine Saß,
Stefanie Seeling, Martin Thißen, Dr. Thomas Ziese
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Gisela Dugnus, Alexander Krönke, Kerstin Möllerke

Please cite this publication as
Busch MA, Kuhnert R (2017) 12-Month prevalence of
coronary heart disease in Germany. Journal of Health
ISSN 2511-2708

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

This work is licensed under a
Creative Commons Attribution 4.0
International License.
12-Month prevalence of stroke or chronic consequences of stroke in Germany

Abstract
Stroke is the second most common cause of death globally and an important cause of disability in adults. According to the GEDA 2014/2015-EHIS study, 1.6% of adults (1.7% of women and 1.5% of men) in Germany had a stroke or chronic consequences of stroke during the past 12 months. For those aged under 55 years, the 12-month prevalence of these health problems remains well below 1% for both sexes, but then increases steeply and disproportionately to 6.3% for those aged 75 years and over. Prevalence among women with a low level of education (3.6%) is higher than among women with a high level of education (0.6%). Education has only a weak effect on prevalence among men. The indicator analysed here (12-month prevalence of stroke or chronic consequences of stroke) was developed for the European Health Interview Survey (EHIS) 2014/2015, which means that comparative data for Germany is not yet available.

Introduction
Stroke is a disease of the brain characterised by sudden damage to brain tissue following either blockage of blood vessels (ischemic stroke) or bleeding (haemorrhagic stroke) in the brain [1, 2]. About 80-85% of strokes are ischemic strokes resulting from an acute blockage of a brain artery by a blood clot. Ischemic strokes are caused mostly by atherosclerosis of the carotid or cerebral arteries or blood clots from the heart caused by atrial fibrillation or heart valve diseases [1, 3, 4]. Haemorrhagic strokes in contrast typically occur due to ruptures of small arteries deep in the brain weakened by the long-term effects of high blood pressure. Insufficient blood supply or bleeding in the brain cause localised or generalized dysfunction to the brain, resulting in sudden neurologic symptoms. The most frequent symptoms are paresis (weakness) or paralysis and impaired sensation (numbness) of arm, leg or face (mostly limited to one side of the body), speech problems, loss of vision, dizziness, unconsciousness and severe headache.

Stroke is the second most common cause of death in Germany and globally [2, 5, 6] and one of the most frequent causes of disability in adults [2, 6, 7]. One third to one quarter of all stroke patients die within the first year after a stroke [1, 8, 9]. Up to 40% of those who survive will suffer longer-term impairments in daily activities. They may find it hard to move, wash or dress on their own or to eat [1, 2, 10-12]. In many cases, this means they will...
require nursing care. An analysis of claims data from statutory health insurance providers in Germany showed that the percentage of people who receive professional care increases by 13% to 19% after a stroke [13, 14].

In high-income countries, stroke mortality rates as well as the rate of new cases (incidence rate) have dropped continuously for many years [1, 2]. Demographic changes and the ageing of populations, however, have led to an increase in the absolute number of stroke patients in the population and this figure will probably continue to rise [1, 2].

Planning prevention and care will require information on the disease burden of stroke for the population. This has led to the introduction of an indicator for European health monitoring to measure the frequency and impact of stroke over time in European Union (EU) countries [15]. In the context of the European Health Interview Survey (EHIS) 2014/2015, the Robert Koch Institute’s study German Health Update (GEDA) 2014/2015 for the first time collected data on this indicator in Germany [16]. A Focus article in this edition describes European health monitoring and health indicators in more detail [17].

Methods
GEDA 2014/2015-EHIS surveyed various diseases and health problems. ‘During the past 12 months, have you had any of the following diseases or conditions?’ the survey asked, followed by a list of diseases. Participants were also asked whether they had suffered a ‘stroke’ or ‘chronic consequences of stroke’ during the past 12 months. Participants could fill out the GEDA 2014/2015-EHIS questionnaire in writing or online.

The indicator from European health monitoring used for this analysis is defined as presence of a stroke or chronic consequences of stroke during the past twelve months [15].

The analyses are based on data from 22,599 participants aged at least 18 years with valid answers on the 12-month prevalence of stroke or chronic consequences of stroke, excluding 1,417 participants (5.9% of the entire sample) with missing data on these variables. Analyses were carried out using a weighting factor that corrected for deviations in the sample concerning gender, age, type of community and education deviations the population structure (as of 31 December 2014). The International Standard Classification of Education (ISCED) was used to make participant’s answers on education comparable [18]. A detailed description of the methodology used by GEDA 2014/2015-EHIS can be found in the article ‘German Health Update – new data for Germany and Europe’ [16] in this issue.

Results and discussion
Overall, 1.7% of women and 1.5% of men aged over 18 years reported having had a stroke or chronic consequences of stroke during the past 12 months. The 12-month prevalence of stroke or chronic consequences of stroke is below 1% for people aged under 55 years. Prevalence then increases disproportionately to 6.4% for women and 6.1% for men in those aged 75 years and over. Women with a low level of education reported stroke or chronic consequences of stroke during the past 12 months considerably more often (3.6%) than those with high level of education (1.3%). For men,
12-Month prevalence of stroke or chronic consequences of stroke in Germany

this correlation between stroke and education is far weaker.

The indicator for the 12-month prevalence of stroke or chronic consequences of stroke presented here is taken from European health monitoring and was first surveyed for Germany in GEDA 2014/2015-EHIS. The results confirm the well-known existence of a relation between stroke and older age and lower socio-economic status [2, 19]. In line with data on the lifetime prevalence of stroke, no relevant differences between genders were found [2]. In a European comparison, variability between EU countries in the 12-month prevalence of stroke or chronic consequences of stroke was very low [17].

Due to methodological differences, prevalence as reported by the new EHIS indicator cannot be directly compared to other epidemiologic data. Firstly, the indicator for the first time combines stroke and chronic consequences. By including chronic consequences, the subjective perception of participants, which in turn is probably influenced by factors such as education and gender, has a greater weight in the mixed indicator. Secondly, unlike in most other international health surveys, the new EHIS indicators did not ask explicitly for physician-diagnosed diseases [20-22].

Instead of using the 12-month prevalence reported in the EHIS survey, epidemiologic surveys and health reporting generally report and base their comparisons on the lifetime prevalence of physician-diagnosed stroke [2, 22, 23]. For Germany, the GEDA 2009/2012 study estimated a lifetime prevalence of 2.4% for women and 2.6% for men [2]. Prevalence in Germany seems not to have changed much during the past twelve years and there are apparently no significant differences to other countries [2, 20].

Considered separately, the indicator ‘chronic consequences of stroke’ in GEDA 2014/2015-EHIS evidences

<table>
<thead>
<tr>
<th>Women</th>
<th>%</th>
<th>(95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women total</td>
<td>1.7</td>
<td>(1.4-2.0)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–44 years</td>
<td>0.3</td>
<td>(0.1-0.6)</td>
</tr>
<tr>
<td>45–54 years</td>
<td>0.5</td>
<td>(0.2-1.0)</td>
</tr>
<tr>
<td>55–64 years</td>
<td>1.3</td>
<td>(0.8-2.0)</td>
</tr>
<tr>
<td>65–74 years</td>
<td>3.4</td>
<td>(2.5-4.7)</td>
</tr>
<tr>
<td>≥75 years</td>
<td>6.4</td>
<td>(4.8-8.5)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>3.6</td>
<td>(2.7-4.7)</td>
</tr>
<tr>
<td>Medium</td>
<td>1.2</td>
<td>(0.9-1.6)</td>
</tr>
<tr>
<td>High</td>
<td>0.6</td>
<td>(0.4-1.1)</td>
</tr>
<tr>
<td>Total (women and men)</td>
<td>1.6</td>
<td>(1.4-1.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Men</th>
<th>%</th>
<th>(95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men total</td>
<td>1.5</td>
<td>(1.3-1.8)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–44 years</td>
<td>0.1</td>
<td>(0.0-0.4)</td>
</tr>
<tr>
<td>45–54 years</td>
<td>0.9</td>
<td>(0.5-1.5)</td>
</tr>
<tr>
<td>55–64 years</td>
<td>1.6</td>
<td>(1.1-2.5)</td>
</tr>
<tr>
<td>65–74 years</td>
<td>3.8</td>
<td>(2.8-5.2)</td>
</tr>
<tr>
<td>≥75 years</td>
<td>6.1</td>
<td>(4.7-8.0)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1.9</td>
<td>(1.3-2.6)</td>
</tr>
<tr>
<td>Medium</td>
<td>1.5</td>
<td>(1.2-2.0)</td>
</tr>
<tr>
<td>High</td>
<td>1.3</td>
<td>(1.0-1.7)</td>
</tr>
<tr>
<td>Total (women and men)</td>
<td>1.6</td>
<td>(1.4-1.8)</td>
</tr>
</tbody>
</table>

CI=Confidence interval

1.7% of women and 1.5% of men report having had a stroke or chronic consequences of stroke during the past 12 months.
12-month prevalence of stroke or chronic consequences of stroke is below 1% in the age group below 55 years of age and increases disproportionally to about 6% for those aged over 75 years.

Women with a low level of education report stroke or chronic consequences of stroke considerably more often than women with a high level of education. Prevalence among men depends far less on education.

a 12-month prevalence for women and men of 1.1% (data not shown). Taken on its own, this prevalence seems plausible, assuming that 40% of stroke patients suffer from chronic disabilities [1, 2] and a lifetime prevalence of 2.5% [2, 20]. As described above, the validity of information regarding self-perceived chronic consequences of stroke is difficult to evaluate.

The EHIS questionnaire resulted from a long process of consultation between the 28 EU member countries. The questions on chronic diseases, it was decided, would not ask for physician-diagnosed diseases, but for self-perceived diseases and so differed from conventional studies. For heart attack and stroke, it was additionally decided to include chronic consequences of the diseases. These decisions were based on the assumption that this would increase the survey’s relevance for public health and reduce the impact of regional differences in care supply [15-17, 24]. Furthermore, gathering data on 12-month prevalence aimed to shed a light on the current burden of these diseases and reduce recall bias in data collection [15-17, 24]. The methodological difficulties described above and lacking comparability with other sources of data, however, make it seem unlikely that EHIS indicators for stroke as well as the indicators for heart attack and coronary heart diseases (compare Fact sheet on CHD in this issue [24]) will be used in other surveys beyond EHIS.

In spite of their described limitations, the new EHIS indicators have their value for harmonised, indicator-based health monitoring in the EU that can help identify regional differences, positive and negative trends, as well as the potentials for prevention in European populations and reveal health policy fields that require further action.

References

12-Month prevalence of stroke or chronic consequences of stroke in Germany


12-Month prevalence of stroke or chronic consequences of stroke in Germany

Imprint

Journal of Health Monitoring

Author details
Robert Koch Institute
Department for Epidemiology and Health Monitoring,
Berlin, Germany

Corresponding author
Dr. Markus A. Busch
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin, Germany
E-mail: BuschM@rki.de

Conflicts of interest
The authors declared no conflicts of interest.

Publisher
Robert Koch Institute
Nordufer 20
D-13353 Berlin, Germany

Editors
Dr. Franziska Prütz, Martina Rabenberg, Alexander Rommel, Dr. Anke-Christine Saß, Stefanie Seeling, Martin Thißen, Dr. Thomas Ziese
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Gisela Dugnus, Alexander Krönke, Kerstin Möllerke

Please cite this publication as
DOI 10.17886/RKI-GBE-2017-019
ISSN 2511-2708

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

This work is licensed under a Creative Commons Attribution 4.0 International License.
12-Month prevalence of allergies in Germany

Abstract
The prevalence of allergies has increased dramatically during recent decades, and thus, got into the focus of public health. As part of the 2014 German Health Update (GEDA 2014/2015-EHIS), 28.1% of respondents reported that they were affected by an allergic disease other than asthma. Reports of allergies are more common among women than men and among younger and middle-aged adults than people over the age of 65. Adults with higher levels of education stated more frequently that they are affected by allergies than adults with lower levels of education. Allergic reactions occur in various organ systems, but the skin, mucous membranes, respiratory tract and the intestines are most commonly affected. As allergic reactions often significantly restrict people's quality of life, early diagnosis and appropriate care for sufferers is essential.

Introduction
Well-known symptoms of allergies include a runny nose, sneezing, itchy eyes, breathing difficulties up to shortness of breath, and severe itching of the skin. Allergic reactions are triggered by an excessive reaction of the body’s immune system to otherwise harmless environmental substances (allergens). Allergens are widespread and people are exposed to them through inhalation, diet and direct contact; they normally consist of proteins or protein compounds but have a variety of chemical and physical characteristics. Allergic reactions occur in a range of the body’s organ systems, with the skin and mucous membranes (hay fever, atopic dermatitis and allergic contact dermatitis), the respiratory tract (asthma), the oral cavity and the intestinal tract (food allergies) the most commonly affected. Type I reactions (immediate hypersensitivity) such as hay fever and atopic dermatitis involve the production of allergen-specific immunoglobulin E antibodies (IgE). Allergic sensitisation (atopy) is said to have occurred if these antibodies are detectable in the blood. In other allergic disorders, such as allergic contact dermatitis, an allergic reaction is delayed (Type IV hypersensitivity), and is mediated by specific white blood cells (T-cells) [1].

Since the 1970s, allergies have become significantly more common in Germany [2-7]. Estimates suggest that up to 30 million people are currently affected, and their quality of life and capabilities can be greatly restricted [8]. Moreover, chronic allergic disorders are usually associated with a high degree of care needs. In cases where it is impossible or very difficult to avoid exposure to specific allergens, allergy sufferers – depending on the extent of their disorder – remain reliant on medical treatment for their individual complaints, or specific immunother-
apy as the only existing form of causal therapy so far. No detailed calculations of the costs of allergic conditions in total are available for Germany.

**Indicator**

In the 2014 German Health Update (GEDA 2014/2015-EHIS) the prevalence of allergic disease in the 12-month period that preceded the study was defined by a positive answer to the question ‘Have you had allergy, such as rhinitis, hay fever, eye inflammation, dermatitis, food allergy or other (allergic asthma excluded) in the past 12 month?’ This indicator describes 12-month prevalence of self-assessed current affection by an allergic disease other than asthma.

Analysis is based on data from 23,342 participants aged 18 and above with available information about their 12-month allergy prevalence (674 participants were excluded from the analysis because of missing information). A weighting factor was applied throughout statistical analysis that corrected the sample for deviations from the German population (as of 31 December 2014) in terms of gender, age, type of municipality and level of education. The article entitled German Health Update – New data for Germany and Europe [9], published in this issue, provides a detailed description of the study methodology. A detailed description of health monitoring and health indicators in Europe is provided by a Focus article [10] that is also published in this issue.

**Results and discussion**

28.1% of the adults reported that they are currently affected by allergies other than allergic asthma. Women – at 31.6% – are significantly more likely to report that they are affected by allergies than men – at 24.5%. Young and middle-aged adults (up to 65 years of age) more frequently report that they are affected by allergies than older people. Adults with higher levels of education are particularly affected by allergies. This is especially the case with middle-aged adults aged between the ages of 30 and 64. The tables present the 12-month prevalence of allergies among 18- to 79-year-old adults stratified by gender, age and educational background (ISCED classification of low, medium and high education [11]).

Allergies are on the one hand caused by genetic factors. On the other hand, various non-genetic factors are discussed to be responsible for the significant rise in allergic disease prevalence that has occurred in recent decades. These factors have long been subject to intensive research and include reduced exposure to microorganisms and infectious agents, reductions in parasitic diseases, increased exposure to allergens, environmental pollution and changes to the intestinal flora, but also changes to diet, lifestyle and travelling patterns [12-14].

The results of the German Health Update show that about one third of adults aged between 18 and 79 years assess themselves as suffering from an allergic condition. The higher prevalence of allergies among women than men and in individuals with the highest levels of education is well-known [15].

Although there was no assessment of single allergic conditions, the results still demonstrate a considerable potential for disease. It can be assumed that each positive response to the study’s question on allergies was also linked to a certain level of psychological strain and
Approximately one third of women but only one quarter of men are currently affected by allergies other than allergic asthma.

Table 1
The 12-month prevalence of allergies among 18- to 79-year-old adults, according to gender, age and educational background (n=23,342)
Source: GEDA 2014/2015-EHIS

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age Group</th>
<th>Education</th>
<th>Prevalence % (95%-CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>18 – 29 Years</td>
<td>Low education</td>
<td>38.7 (36.4-41.0)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>39.8 (36.8-42.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>37.9 (33.2-42.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 – 44 Years</td>
<td>Low education</td>
<td>34.8 (32.5-37.1)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>35.3 (32.3-38.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>38.5 (35.0-42.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45 – 64 Years</td>
<td>Low education</td>
<td>32.6 (28.4-37.0)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>31.2 (29.0-33.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>36.4 (33.6-39.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 65 Years</td>
<td>Low education</td>
<td>23.3 (21.2-25.5)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>24.8 (21.8-28.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>24.1 (20.1-28.7)</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>18 – 29 Years</td>
<td>Low education</td>
<td>31.4 (28.8-34.1)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>32.3 (28.7-36.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>32.0 (26.4-38.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 – 44 Years</td>
<td>Low education</td>
<td>28.2 (25.9-30.6)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>26.4 (23.5-29.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>33.2 (29.9-36.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45 – 64 Years</td>
<td>Low education</td>
<td>23.6 (22.1-25.3)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>22.1 (19.9-24.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>27.3 (24.9-29.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 65 Years</td>
<td>Low education</td>
<td>16.2 (14.6-18.0)</td>
</tr>
<tr>
<td></td>
<td>Medium education</td>
<td>15.9 (13.5-18.6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High education</td>
<td>17.5 (15.0-20.2)</td>
<td></td>
</tr>
<tr>
<td>Total (women and men)</td>
<td>28.1 (27.3-29.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(at the very least, symptomatic) medical treatment. However, it has to be noted that laypeople (due to their lack of medical training) often have difficulties in differentiating allergies from ‘pseudo-allergies’ (particularly food intolerances), since both can produce similar symptoms. This is one of the reasons why large-scale national and international epidemiological studies ask questions about specific allergic diseases and often include questions about whether these diseases have been diagnosed by a doctor. Such questions were included in the European ECHRS study (European Community Respiratory Health Survey) and DEGS1 (German Health Interview and Examination Survey for Adults), a representative study of the German adult population, for example. From data of DEGS1, which was conducted between 2008 and 2011 using computer-assisted medical interviews, a 12-month prevalence of nearly 20% for the presence of at least one of seven queried (medically diagnosed) allergies including asthma was estimated [5]. However, estimates of prevalence based on reported medical diagnoses tend to be lower than those ascertained through self-assessments, as many sufferers who have mild symptoms do not visit a doctor.

With respect to time trend in the 12-month prevalence based on self-assessments among adults in Germany, data from three surveys are available for allergic rhinitis.
The 12-month prevalence of allergic disease is higher among adults under 65 than among those over 65 years of age.

Allergic disease is more often reported from adults with the highest levels of education compared to those with lower levels.

(hay fever) [4, 16]. These data demonstrate that the 12-month prevalence almost doubled between 1990/1992 and 2008/2011. Approximately 12.3 million adults in Germany declare to suffer from allergic rhinitis.

Due to the large number of people they affect, allergic diseases are highly relevant to public health. In addition to continuous allergy monitoring and further research on potential risk and protective factors, more efforts are needed to ensure early diagnoses and to develop appropriate forms of care for allergy sufferers. This is not only important for the quality of life of those affected; it is also essential from an economic perspective [8].

References
German Health Update: New data for Germany and Europe

The background to and methodology applied in GEDA 2014/2015-EHIS

Abstract
GEDA 2014/2015-EHIS is an up-to-date health survey of the adult population undertaken within the framework of the Robert Koch Institute’s (RKI) health monitoring system. It uses the EHIS (European Health Interview Survey) Wave 2 questionnaire and includes four modules covering health status, health care, health determinants, and socio-economic variables. Data on nationally relevant issues is also collected. The study employs a mixed-mode design, using both online and paper-based questionnaires to gather data from 24,016 people aged 18 and above: the response rate was 26.9%. The Statistical Office of the European Union (Eurostat) provides prepared data from 28 European Union (EU) member states (plus Norway and Iceland) on the Eurostat website. National analyses for Germany are published as Fact sheets on health reporting in the Journal of Health Monitoring.

1. Background
The German Health Update (GEDA) is a nationwide survey of the adult population in Germany conducted by the Robert Koch Institute (RKI) on behalf of the German Federal Ministry of Health. It is conducted within the framework of the RKI’s population-based health monitoring system. The German Health Interview and Examination Survey for Children and Adolescents (KiGGS) [1] and the German Health Interview and Examination Survey for Adults (DEGS) [2] also form part of the RKI’s health monitoring system. In addition to surveys, physical examinations and tests are conducted for KiGGS and DEGS. Health monitoring is aimed at providing reliable information about the population’s health status, health-related behaviour and health care provision. The data gathered for these studies act as the foundation for the German Federal Health Reporting and are used for epidemiological analyses and research into many important public health issues [3].

Three waves of the GEDA study were conducted between 2009 and 2012 as telephone surveys of more than 60,000 respondents [4]. The results have been published as core health indicators [5-7]. The European Health Interview Survey (EHIS Wave 2) was integrated into the GEDA study for the first time as part of GEDA 2014/2015 [8]. Data collection was conducted via a self-administered paper or online questionnaire. The EHIS study is to be harmonised, and the data it gathers will be comparable with that from other European Union (EU) member states (and Norway and Iceland). This enables the EHIS dataset to serve as a basis for national
and European health policy and health reporting. Moreover, data from EHIS is made available for epidemiological analyses and international comparative studies, and is integrated into the European Core Health Indicators (ECHI) \[9, 10\]. 17 EU countries took part in the first wave of EHIS. At that time, the EU member states were under no legal obligation to participate in the study. The second wave of EHIS was undertaken between 2013 and 2015 in all 28 EU member states (as well as in Norway and Iceland) in accordance with a European Commission regulation \[11, 12\]. The study has to be repeated every five years \[13\].

This article provides a brief overview of the methodology applied in GEDA 2014/2015-EHIS. A detailed description of the study's methodology has been published elsewhere \[14\]. The results of the core health indicators from GEDA 2014/2015-EHIS are also published in this and upcoming issues of the Journal of Health Monitoring as Fact sheets. These Fact sheets provide data, brief analyses and descriptions of trends in Germany. Data for a specific indicator is arranged according to gender, age and education using the International Standard Classification of Education (ISCED) (see Info box). The Fact sheets published in this issue describe the prevalence of chronic diseases (hypertension, diabetes mellitus, coronary heart disease, stroke and allergies). The Fact sheets published in the next issue will focus on indicators of health- and risk-related behaviour.

2. The methods used in GEDA 2014/2015-EHIS
2.1 Sample design

The GEDA 2014/2015-EHIS study is based on a two-stage stratified cluster sample design. In accordance with EHIS guidelines, the dataset includes the entire population aged 15 and over that has permanent residence in Germany. Analyses for the national GEDA study are based on data from adults aged 18 and over. Sampling was conducted in two phases. The first phase involved the random selection of 301 municipalities aimed at reflecting the different sizes of municipalities and regions in Germany (based on the BIK regional classification system for Germany) \[15\]. The selection was undertaken by GESIS (the Leibniz Institute for the Social Sciences) in Mannheim, Germany. Selected municipalities with less than 1,000 residents were combined with similarly sized neighbouring communities to form a single locality. In addition, several cities with large populations were represented as a number of communities. The map (see Figure 1) shows the locations that were selected. In the second phase, people with permanent residency in these locations were randomly drawn from local population registers. The required gross sample size for each age group was calculated based on the responses provided to the preliminary tests. The required net sample size was calculated by the Statistical Office of the European Union (Eurostat) for Germany as n=15,260 \[8\]. However, in order to obtain more precise estimates and to enable regional analyses of each of the 16 German federal states, the sample size was revised upwards to n=20,000 \[16\]. Consequently, each of the 301 locations required an average of 67 participants.
2.2 Questionnaire

The GEDA 2014/2015-EHIS study used a questionnaire; it did not include physical examinations or laboratory tests. The questionnaire for GEDA 2014/2015-EHIS consisted of two components: the questionnaire from EHIS Wave 2 (which was used in all participating countries) and questions that were only asked in Germany. By providing additional questions about specific national issues, it was possible to obtain a time series from GEDA [4] and information about further relevant topics in Germany. The EHIS Wave 2 questionnaire consists of the following four modules:

- health status (self-awareness, chronic diseases, limitations, mental health, pain, accidents, etc.)
- health determinants (smoking, alcohol consumption, weight, physical activity, dietary habits, etc.)
- health care (use of different types of health services such as hospitalisation, outpatient visits, prevention, medication, unmet health care needs)
- background variables on demographic, geographical and socio-economic characteristics of respondents (gender, age, education, household type, etc.).

The questionnaire for EHIS Wave 2 was translated according to the recommended translation protocol [5]. Some modules used validated German versions of the questionnaire. Adjustments were also made to the language deployed in order to meet the requirements of self-administered questionnaires (whether on paper or via the internet). Alongside the national questions, the EHIS Wave 2 questionnaire was expanded to include modules on health literacy, stroke-related knowledge, subjective socio-economic status and working conditions. The questionnaire is published (only in German) as a supplement to the current German issue of the Journal of Health Monitoring. It can be used for research as long as the source is properly cited.
3. Distribution, data protection, quality assurance

Data collection for GEDA 2014/2015-EHIS took place between November 2014 and July 2015. The study was approved by the German Federal Commissioner for Data Protection. Participation in the study was voluntary, with the participants informed about the objectives and content of the study as well as data protection. All participants provided their informed consent.

The gross sample amounted to 92,771 people (aged 15 and above). In order to account for seasonal variations, the sample was randomly divided into two tranches. Data collection for the first tranche was conducted in autumn and winter 2014, with data collection for the second tranche occurring in spring and summer 2015. Based on experience gained from various other methodologically-oriented studies, GEDA 2014/2015-EHIS used a sequential mixed-mode design; this was the first time that this had been done for a GEDA study. GEDA 2014/2015-EHIS employed self-administered questionnaires that could be filled out over the internet or on paper [18-20]. All participants initially received a letter inviting them to complete the online questionnaire. This letter contained the relevant URL, the registration code for accessing the online questionnaire, the consent form as well as detailed information about the study and data protection. A reminder was sent out four weeks later. The reminder included a paper questionnaire (as well as a consent form), alongside the URL and registration code. Four weeks after this, a second paper reminder was sent out. A telephone helpline was available during the eleven-month survey period for everyone who had been invited to participate. A study website was also set up to provide information.

Respondents aged between 15 and 34 were offered a €10 voucher to encourage participation. Respondents aged 35 or above had the chance of participating in a lottery in which they could win a €50 voucher. Regional and local newspapers were also contacted, and a press release with important information about the study was sent out with the request for publication.

Extensive quality assurance measures were carried out during the field phase. The data management process for GEDA 2014/2015-EHIS was coordinated by the Epidemiological Data Centre at the Robert Koch Institute. In creating the dataset, the quality and validation guidelines stipulated by Eurostat for EHIS Wave 2 were implemented [8]. The dataset was transmitted to Eurostat in June 2016, which then tested, approved and certified its validity.

4. Response rate and net sample

The data analysis for Germany was based on a sample of the participants aged 18 and above. A total of 24,016 fully-completed questionnaires were available from this age group; 10,723 of which had been completed online (44.6%), with 13,293 completed on paper (55.4%). The response rate, which was 26.9% (women 27.5%; men 25.3%), was calculated according to standards developed by the American Association for Public Opinion Research (AAPOR) [21] and reflects the typically low rates gained from other population-based health surveys. The rejection rate was 6.8% (cases where participation in the sur-
The highest response rate was observed among the 55 to 74 age group. Among men between 65 and 74, for example, the response rate was 35.2% (women 31.7%); the response rate among men belonging to the youngest age group (18 to 24) was just 22.4% (women 34.6%). Differences were also observed between genders: the response rate was higher for women under 65, and higher for men aged 65 or above. Lange et al. provides detailed information about sampling coverage and the composition of the net sample [14].

5. Weighting

A weighting factor was deployed which corrects deviations in the sample from the German population structure. Both design and adjustment weighting were used. Design weighting takes into account the probability of selecting a particular location for study and the probability of selecting a particular participant within a given location. Adjustment weighting enables age and gender within the federal states to be extrapolated to the entire population (as of 31 December 2014) as well as adjustments to be made for location types and regional distribution within Germany. These weighting factors mean that international comparisons can be performed with EHIS data. An additional adjustment was made for national analyses to correct for differences in the educational level of the population in accordance with the guidelines accompanying the 2013 micro-census. This weighting factor is also used in the GEDA Fact sheets that present the results of selected health indicators for Germany (hypertension, diabetes mellitus, coronary heart disease, stroke and allergies).

6. Closing remarks

The implementation of the European Health Interview Survey (EHIS) as part of the RKI’s health monitoring system provides numerous opportunities for data analysis and insights at the European level. The Eurostat website provides prevalence data from EHIS Wave 2 (macro-data) for 30 European countries (28 EU member states plus Norway and Iceland) [22] (see also Fehr et al. [23] in this issue). Micro-data from EHIS (individual data from participants from 28 EU member states) should be available for research purposes by the end of 2017 from Eurostat on request.

The variables selected for EHIS Wave 2 were developed through an extensive process leading to consensus between various European countries. However, the final selection posed a methodological challenge for health monitoring in Germany: even when individual variables were supplemented for GEDA 2014/2015-EHIS, current data could not be gathered for all of the indicators that have been studied in Germany in the past. Moreover, despite the modifications made to the study design (online and paper questionnaires were deployed using a sample gained from the registry office instead of using telephone surveys based on a sample of landline telephone numbers), gaps in the time series could not be avoided. Nevertheless, the adjustments made to the GEDA study design mean that it more closely resembles DEGS and KiGGS. These two health monitoring studies,
which include physical examinations and tests, also use a written survey among a sample taken from the population register. For a number of years, telephone studies that have not involved prior contact to potential participants have seen a continual reduction in response rates [7]. This problem also affected the GEDA waves conducted between 2009 and 2012. However, changes to the survey mode that were implemented for GEDA 2014/2015-EHIS have been able to halt this trend [14].

References

Data for Germany is published in this journal; EHIS data from around 30 European countries is available on the Eurostat website.


Imprint

Journal of Health Monitoring

Author details
Robert Koch Institute
Department for Epidemiology and Health Monitoring,
Berlin, Germany

Corresponding author
Dr. Anke-Christine Saß
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin, Germany
E-mail: SassA@rki.de

Conflicts of interest
The authors declared no conflicts of interest.

Publisher
Robert Koch Institute
Nordufer 20
D-13353 Berlin, Germany

Editors
Dr. Franziska Prütz, Martina Rabenberg,
Alexander Rommel, Dr. Anke-Christine Saß,
Stefanie Seeling, Martin Thißen, Dr. Thomas Ziese
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Gisela Dugnus, Alexander Krönke, Kerstin Möllerke

Please cite this publication as
ISSN 2511-2708

The Robert Koch Institute is a Federal Institute within the portfolio of the German Federal Ministry of Health
Diabetes Surveillance in Germany – Background, concept and prospects

Abstract
Diabetes mellitus is a chronic disease that is associated with serious health problems and high costs. According to estimates gained from nationally representative health surveys conducted by the Robert Koch Institute (RKI), 4.6 million adults aged 18 to 79 suffer from diabetes in Germany. In addition, around 1.3 million adults have undetected diabetes. A surveillance system is currently being established at the RKI in order to gather the data sources available on diabetes in Germany and to provide reliable and comparable findings on time trends covering the frequency, progress of treatment, prevention and care of the disease. Next to identifying trends, diabetes surveillance also needs to detect differences in epidemiology that are related to social status or geographic region. Diabetes surveillance at the RKI is being undertaken in close cooperation with stakeholders involved in science, health-care provision, health policy and health-system self-governance. Furthermore, its progress is accompanied by an interdisciplinary scientific advisory board.

Diabetes surveillance involves the following key elements: 1) the development of a research-based conceptual framework that uses indicators to appropriately measure developments in the disease; 2) the establishment of standards for the use of existing data sources and the identification of barriers to data usage and gaps in the data; and 3) the implementation of focused health reporting that is geared towards the target group. In addition to policy consultations, diabetes surveillance must guarantee the provision of timely and continuous information to the public together with the Federal Agency for Health Education. The implementation of a diabetes surveillance in Germany should act as a model and serve as a basis with which to establish the surveillance of other non-communicable diseases.

In principle, indicator-based diabetes monitoring at the population level can be viewed as providing the body for evidence-based policy consultation and focused health policy. In turn, this should enable the implementation of effective disease prevention measures and high-quality care for all groups within the population.
1. Background and aims

Diabetes mellitus covers a group of diseases that are characterised by a permanent increase in blood glucose concentrations. Diabetes is caused by a disorder of insulin secretion, reduced insulin sensitivity (insulin resistance) or a combination of both factors. There are two main forms of the disease: type 1 diabetes mellitus is an autoimmune disease caused by impaired insulin secretion resulting from the destruction of islet cells in the pancreas. By contrast, insulin resistance is the main factor in type 2 diabetes mellitus. Alongside a genetic predisposition, lifestyle factors play a crucial role in developing type 2 diabetes. In Germany, estimates from nationally representative health surveys conducted by the Robert Koch Institute (RKI) demonstrate that 4.6 million adults aged 18 to 79 have diabetes. In addition, around 1.3 million adults have undetected diabetes [1]. Current figures on the prevalence of diabetes in Germany as well as regional frequency distributions can be found in a separate article in this issue [2].

According to the latest research, approximately 90% of cases of the disease are type 2 diabetes mellitus. Men generally demonstrate a higher lifetime prevalence of diabetes in epidemiological studies than women [3]. In addition, a lower socioeconomic status is strongly linked to an increased disease prevalence [4]. Gestational diabetes is a special form of diabetes mellitus caused by insulin resistance which generally recedes after pregnancy; however, women with this form of the disease have a significantly higher risk of developing type 2 diabetes mellitus in later life [5, 6]. Importantly, if diabetes goes undetected or remains inadequately treated, it can cause life-threatening metabolic imbalances. Chronically elevated blood glucose levels result in the damage of blood vessels and the peripheral nervous system [7]. As a consequence the risk of cardiovascular disease, renal dysfunction, retinal damage and diabetic foot syndrome is increased [8, 9]. In addition, diabetes also causes long-term complications such as heart attacks, stroke, chronic kidney failure, blindness and amputations of the feet. Finally, pregnant women who have pre-existing diabetes or who develop diabetes during pregnancy have an increased risk of adverse pregnancy outcomes [10].

However, diabetes is not just linked to adverse effects for the individuals concerned, but also to costs to society. On the one hand, these costs arise from the expenses incurred through treatment (direct costs) and, on the other hand, due to the aggregate loss of economic productivity caused by sufferers’ incapacity to work and premature retirement (indirect costs). The German Federal Statistical Office estimates that the medical expenses accrued due to diabetes amounted to €6.3 billion in 2008 alone [11]. Current estimates calculate the annual medical expenses associated with diabetes as amounting to €16.1 billion [12]. Medical costs for people with diabetes are therefore between 1.7 and 1.8 times higher than for people without the disease [12-14].

In 1989, the St Vincent Declaration was adopted at the international level as a means of reducing the secondary health problems and premature mortality associated with diabetes (see Info box 1). Efforts to improve the treatment of people with diabetes have also been undertaken at national level, with improvements to care

---

Info box 1: The goals of the St Vincent Declaration (1989) [45]
- Reduce new diabetes-related blindness by a third or more
- Reduce the frequency of diabetes-related terminal kidney failure
- Reduce the number of amputations due to diabetes-related gangrene by at least one half
- Reduce morbidity and mortality due to coronary heart disease in people with diabetes via intensive programmes aimed at reducing risk factors
- Normal pregnancy outcomes in diabetic patients and a similar rate of complications to those found in non-diabetic women
being implemented at health-system level. Since the introduction of the National Disease Management Guidelines (NDMG) on type 2 diabetes mellitus in 2002, evidence-based support is available to help make decisions on medical care; NDMG are continuously updated to reflect the latest research [15]. In 2003, the Disease Management Programmes (DMP) were first implemented for type 2 diabetes mellitus and later on expanded to type 1. The aim of the DMP is to ensure that patient treatment is structured, and that treatment outcomes are reviewed in accordance with established therapy and quality objectives [16, 17]. Over the last few years, enrolment in the DMP has steadily increased: in 2015, around 4 million patients with diabetes mellitus were enrolled in the programmes [18]. In addition, in 2003, the national health goal ‘Type 2 diabetes mellitus: reduction of disease risk, early recognition and treatment of patients’ was adopted; it defined specific measures and led to the establishment of pilot schemes in health care practice [19]. Alongside scientific evidence from studies of care provision, trend analyses based on the RKI’s health data also suggest that the structural changes mentioned above have contributed towards an improved care of people with diabetes [20, 21].

The situation described above demonstrates that diverse data sources and information and numbers already exist to measure occurrence of diabetes and care. However, until now, Germany’s federalist and pluralist health system has measured diabetes using data obtained from different sources each with a specific research focus. As such, these analyses have been limited in scope, and were not necessarily even based on a sustainable data source. In addition, their findings are rarely comparable as they focus on a variety of time periods and define their indicators in different ways. This situation makes it difficult to provide timely, evidence-based policy advice, which by contrast need reliable and comparable measures of the developments in diabetes and diabetes care.

Despite the fact that diabetes mellitus has high public health relevance, a comprehensive and continuous analysis of the disease, its consequences, developments in risk and care and the potential for prevention, have not yet been established at the population level. This is due to the complex causes of the disease, but also because of the fragmented data collection being undertaken and the fact that current data is usually tied to a specific purpose, as stated above. In addition, existing barriers to the use of secondary data (see info box 2) for research into scientific issues still need to be identified and dismantled.

In the coming years, the RKI intends to establish a form of sustainable diabetes surveillance that is in line with the approach adopted by the World Health Organization (WHO) on the prevention and control of non-communicable diseases [22] and the associated recommendations on establishing effective surveillance mechanisms. The aim is to develop a form of diabetes surveillance that can be applied to the surveillance of other non-communicable diseases (as part of Non-communicable Disease Surveillance, NCD). This involves expanding the RKI’s existing health monitoring measures and integrating current data sources into an overall approach to diabetes surveillance (see Figure 1).

Info box 2: The definition of secondary data

In contrast to primary data, secondary data are data that were not gathered for a pre-defined investigative or research interest or that are analysed in a manner that is different from the original reason the data was collected. Boosted by the development of storage and computing capacities, in recent years, process-produced, and routinely-collected information has been harnessed increasingly for evaluations in health research. This also applies to data gathered from the contributions to and range of services provided by statutory health insurers. These developments have led the term ‘routine data’ to become synonymous with the more established term ‘secondary data’. A comprehensive overview of the issues associated with secondary data can be found in the manual ‘Routinedaten im Gesundheitswesen’ [46].
As is clear from info box 3, the development of health monitoring into a disease-specific form of surveillance means that, in addition to the recurring epidemiological description of the course of the disease and diabetes care, as derived from surveys based on interviews and examinations, timely analyses can be produced using regularly available routine data. Combining the primary data that the RKI already collects with secondary data sources enables a reliable and continuous data pool to be made available to health-policy decision-makers. Moreover, prompt demonstrations can then be provided of the specific areas where action needs to be taken, which can be followed up by targeted public health measures [23].

2. Project planning

The research project at the RKI aimed at developing a system of diabetes surveillance was initiated in December 2015. It is to extend over a four-year period and is funded by the Federal Ministry of Health.

The project is divided into three overlapping phases:

Planning phase
- Review available data sources
- Define appropriate core indicators and gain a consensus about them
- Develop a conceptual framework

Implementation phase
- Establish standards for merging information from different data sources
- Identify barriers to usage, and data gaps
- Conduct feasibility and comparative studies with research partners on the use of existing data sources

Product phase
- Develop a model for regular, focused reporting
- Analyse the sustainability of the underlying data and the transferability of experiences and processes to other chronic diseases

Info box 3: Health monitoring and surveillance [47, 48]

Health monitoring
- Periodically recurring collection and analysis of health data at the population level
- Comparable over time and internationally
- Scientific analyses and health monitoring for politics and the public

Surveillance
- Intensified monitoring of health problems that require increased vigilance
- Systematic analyses and current interpretations of continuously available health data
- ‘Data for Action’: policy advice, accompanying and evaluation research, development of measures

National diabetes surveillance at the Robert Koch Institute

Federal Health Monitoring at the Robert Koch Institute
- Administrative and health claims data (e.g. social insurance data)
- Diabetes Register (e.g. children and adolescents, pregnancy)

Regional Disease Registers (heart attack, renal insufficiency)

Regional cohort studies (e.g. KORA, SHIP)

Official statistics (e.g. mortality and hospital statistics)

KORA = Cooperative health research in the Augsburg region (Kooperative Gesundheitsforschung in der Region Augsburg)
SHIP = Study of Health in Pomerania (Leben und Gesundheit in Vorpommern)
From the planning phase to the beginning of the project, the focus has been placed on the development of a conceptual framework, the selection of indicators that appropriately capture the situation of diabetes in Germany, as well as an initial review of available data sources. The indicators need to reflect the evidence gained from indicators that have already been applied in the structured observation of diabetes mellitus in other countries [24-27] and international recommendations on the development of sustainable indicators [28-31].

During the implementation phase, which started parallel to the planning phase, analyses are conducted of existing data sources together with project partners to identify the ways in which the chosen indicators can be measured and to determine barriers to data usage and any remaining data gaps. During this phase, the RKI also examines how the health care data from the German statutory health insurance funds (which is provided by the German Institute of Medical Documentation and Information – DIMDI) [32] can be continually integrated into diabetes surveillance.

During the product phase until the end of the project, a model form of focused diabetes reporting that is properly geared towards the target group is to be established as part of health reporting. The goal is to provide regular information to stakeholders in health policy, the public and science in the form of standardised analyses based on the indicators defined in the project about developments in diabetes in Germany.

An interdisciplinary project advisory board, which began its work in September 2016, accompanies project implementation [33]. The Scientific Advisory Board usually meets twice a year as part of a common board meeting.

Diabetes surveillance is also intended to provide a forum for international scientists and diabetes researchers from Germany, as well as patient representatives and health policy stakeholders to meet at conferences and workshops. On the one hand, the aim is to promote learning and knowledge transfer that can be incorporated into diabetes surveillance, but it is also aimed at improving networking between the people and institutions involved.

### Relevant fields of action for the development of indicators in diabetes surveillance

Source: own diagram

- **Reduce the risk of diabetes**
  - Prevalence of risk factors linked to behaviour or specific conditions and resources; incidence of diabetes

- **Improve early diagnosis and treatment**
  - Prevalence of known/undetected diabetes; structure, process and outcome quality indicators

- **Reduce the complications caused by diabetes**
  - Frequency of long-term effects, mortality (the St Vincent goals)

- **Reduce the burden and costs of the illness**
  - Direct/indirect costs; the number of years spent ill/healthy
3. Current status

3.1 Developing a conceptual framework and defining core indicators

Four fields of action were defined in line with the health objective ‘Type 2 diabetes mellitus’ (which was adopted in 2003) and the Health Care Quality Indicators’ framework [34] developed by the Organisation for Economic Co-operation and Development (OECD). These fields were then assigned relevant concepts for the development of related indicators (see Figure 2).

The first step towards defining a set of core indicators involved a review of internationally established surveillance systems and diabetes registers. The review focused on the specifics of German health care and the German health care system. Potential single indicators were also compiled in parallel using a systematic literature study undertaken by the Institute for Applied Quality Improvement and Research in Health Care (AQUA). In a second step, an international expert workshop on indicator development took place in Berlin [35]; this was conducted after a structured review of indicators that had already been applied in research. The feedback from the expert panel was prepared both qualitatively and quantitatively and provided to the advisory board. In order to gain consensus on a core set of indicators, the indicators identified in this process will be evaluated in terms of relevance and feasibility using the Delphi method [36, 37].

It is unlikely that it will be possible to measure all indicators properly at the beginning of a study using existing data sources. Therefore, in addition to quality criteria, public health relevance, validity, clarity, sensitivity to change, comparability and health policy adaptability [30], data availability also represents an important criterion in the selection of indicators. Relevant indicators that cannot be properly captured using existing data sources are to be integrated into diabetes surveillance as part of a later step (see Figure 3).

The process of consensus used to select core indicators is to be completed in the first half of 2017, with the framework for diabetes surveillance due to be published soon afterwards.

Until now, very little data has existed for Germany on self-reported impairments, disease-specific knowledge and the informational needs of the people suffering from diabetes. For this reason, the RKI, in close cooperation...
A diabetes surveillance system covering Germany is being established at the Robert Koch Institute in close cooperation with stakeholders from science, care, health service self-administration and health policy.

Diabetes Surveillance in Germany – Background, concept and prospects

with the Federal Centre for Health Education (BZgA), intends to conduct a separate nationally representative telephone survey of adults aged 18 and over on these issues. The survey’s findings are to be incorporated into an information and communication strategy being planned by the BZgA.

3.2 Conferences and workshops

The conceptual development of diabetes surveillance is supported by an intensive professional exchange conducted during expert workshops and specialist conferences that are regularly held during the duration of the project.

▸ Diabetes Register Conferences, in cooperation with the German Diabetes Association (DDG) and diabetesDE – German Diabetes Hilfe (launch event in Berlin, 22 April 2015)
  ▸ Definition of what is required of a national diabetes register/diabetes surveillance
  ▸ Possibilities and prospects of integrating diabetes registry data into a system of national diabetes surveillance
  ▸ Aims, data availability and data quality of diabetes surveillance in Germany

▸ Talks between the Federal (Federal Ministry of Health) and federal state level (launch event in Berlin, 22 July 2015)
  ▸ Coordination and cooperation with the federal states during regular workshops at the level of the Permanent Working Group of the Highest State Health Authorities (AOLG), AG Health Monitoring
  ▸ Regionalisation of diabetes reporting

▸ National expert workshops on the use of secondary data (launch event in Berlin, 7 December 2015)
  ▸ The use of health care data from the German Institute of Medical Documentation and Information (DIMDI) based on the Data Transparency Regulations (DaTraV)
  ▸ Integration, consolidation and use of additional secondary data sources in diabetes surveillance

▸ International expert workshops (launch event in Berlin, 11 July 2016) [35]
  ▸ Development and international comparability of indicator-based surveillance systems in Germany
  ▸ Best practice models for a national diabetes report

3.3 Review of data availability and usability

A key result of the diabetes register conferences listed above was that four methods projects on the use of secondary and registry data were initiated together with universities and other scientific institutions (see Table 1). The aim of these collaborations is to analyse the suitability of existing data sources for incorpo-
Diabetes Surveillance in Germany – Background, concept and prospects

The harmonisation and correlation of register data

<table>
<thead>
<tr>
<th>Project aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Prevalence estimates of type 1 diabetes in adults</td>
</tr>
<tr>
<td>▶ Prevalence estimates of type 2 diabetes in adolescents (11-17 years)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data source(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Child Diabetes Register DIARY (Diabetes Incidence Registry)</td>
</tr>
<tr>
<td>▶ Diabetes Register North Rhine-Westphalia</td>
</tr>
<tr>
<td>▶ Saxony’s Diabetes Register</td>
</tr>
<tr>
<td>▶ Diabetes Patients Progress Documentation (DPV-Register)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ University of Ulm</td>
</tr>
<tr>
<td>▶ University of Tübingen</td>
</tr>
<tr>
<td>▶ Technical University Dresden</td>
</tr>
<tr>
<td>▶ German Diabetes Centre (DDZ), Düsseldorf</td>
</tr>
</tbody>
</table>

Measuring the quality of care using routine data

<table>
<thead>
<tr>
<th>Project aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Definition of core indicators measuring care quality</td>
</tr>
<tr>
<td>▶ Determination of a minimum data set</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data source(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Routine data from AOK (a large statutory health insurance company) Baden-Württemberg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ University of Heidelberg</td>
</tr>
<tr>
<td>▶ Institute for Applied Quality Improvement and Research in Health Care (AQUA) Göttingen</td>
</tr>
</tbody>
</table>

Expansion of data on quality of care in cases of gestational diabetes

<table>
<thead>
<tr>
<th>Project aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Expansion of the gestational diabetes register and the development of a pilot region (North Rhine)</td>
</tr>
<tr>
<td>▶ Analysis of the quality of care provided to women with gestational diabetes</td>
</tr>
<tr>
<td>▶ Analysis of gestational diabetes screening</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data source(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Gestational diabetes register (GestDiab)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Scientific Institute of established Diabetologists (winDiab)</td>
</tr>
</tbody>
</table>

Surveillance of potentially avoidable hospital admissions (AHA) in cases of diabetes mellitus

<table>
<thead>
<tr>
<th>Project aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Definition of relevant indicators for analysis of AHA in cases of diabetes mellitus</td>
</tr>
<tr>
<td>▶ Calculation of population-based rates of AHA</td>
</tr>
<tr>
<td>▶ Setting up of a time series 2005-2014</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data source(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Statistics on Diagnosis Related Groups (DRG) (Federal Statistical Office)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Project partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Hochschule Niederrhein</td>
</tr>
</tbody>
</table>

The projects presented here can be expected to provide important insights and indicators into developments in diabetes and diabetes care. For example, due to the low prevalence of type 1 diabetes and type 2 diabetes in children and adolescents, the RKI’s health surveys cannot provide any nationally representative findings on either form of the disease. In the future, these data gaps are to be closed by integrating data from the four existing registers covering type 1 diabetes in children and adolescents in Germany. In particular, the...
Due to the high disease frequency and the burden caused by diabetes, continuous observation and analysis of developments associated with the disease and its care are needed.

nationwide Diabetes Patient History Register (DPV) is focused on the continued observation of young patients into early adulthood and on the analysis of health care needs and the quality of care provision. Another project will provide data on gestational diabetes screening (which has been stipulated by law since 2015) and, thus, help improve the care of women with this form of the disease. Furthermore, potentially avoidable hospital admissions (AHA), in other words hospitalisations that could be avoided if care were better coordinated, constitute an important quality indicator of outpatient care, especially in the case of diabetes [38]. Moreover, in addition to survey and register data, increased use of secondary data sources is needed, in particular in order to be able to better represent aspects that are relevant to care using indicators of structural, process and outcome quality. To this end, the methods projects are developing suggestions as to which indicators can be represented using routine data from statutory health insurers and how this process can be better consolidated.

In the coming years, projects are also planned in cooperation with scientific project partners. The choice of projects depends on established criteria aimed at ensuring that their analyses and results can be integrated into diabetes surveillance.

4. Discussion

Unlike in some other countries, there is no continuous analyses or reporting aimed to summarize developments in diabetes mellitus or its associated health care provision being conducted in Germany. Data from other countries with an established surveillance system, such as the United States, have shown that active and systematic monitoring of developments in the disease have significantly reduced diabetes- and cardiovascular-related hospitalisations, in particular. Furthermore, appropriate preventive measures have also reduced the proportion of diabetes-related eye diseases and the rate of new occurrences of kidney disease [9, 39, 40]. Smaller countries with established disease registers, such as Denmark, Sweden and Scotland, have also noted improvements in diabetic care [41-43]. Although similar trends have been observed for Germany [20], the federal structure of the German healthcare system means that it has been difficult to develop a continuous and comparable analysis of health care provision over time.

The implementation of an indicator-based system of diabetes surveillance in Germany would finally make it possible to conduct comparative summarising analyses of the dynamics of diabetes as well as disease prevention and care provision over time. By developing a form of systematic diabetes surveillance, we can expect care structures and treatment approaches to be regularly evaluated in the future; this will make it possible to gauge the benefits they provide. Moreover, diabetes surveillance will also provide health policy-makers with evidence-based data that can be used to make decisions about the targeted allocation of funding aimed at improving care and diabetes prevention. However, in this regard, it is crucial that surveillance and health monitoring is geared towards the target group and that various disease prevention and care needs can be differentiated between so they can be represented according to
socio-demographic and regional aspects over time. This is the only way of ensuring that health policy can provide a targeted and evidence-based response. This applies as much to primary preventive measures aimed at reducing the risk of diabetes as to secondary and tertiary prevention strategies aimed at improving diagnosis and treatment in order to prevent long-term complications. Close and continuous cooperation between epidemiology and care, as well as strong networking with health policy-makers, are of essential importance if the results of diabetes surveillance are to be of practical use. The experience gained outside of Germany demonstrates that the success of surveillance is dependent on the following factors:

- Agreement between all stakeholders from research, health practice and health policy about common goals and the consequences of action
- The application of defined quality criteria in the selection of indicators
- The possibility of developing stratified analyses that take into account socio-demographic and regional differences

As stated in the introduction, it is highly likely that adults with diabetes mellitus will develop other chronic diseases (co-morbidities). However, the majority of concomitant diseases and complications are linked to lifestyle-related risk factors such as obesity, a lack of physical activity and smoking. Therefore, diabetes surveillance needs to deploy a data pool and indicators that are relevant for the study of other non-communicable diseases. In Canada, it has been shown that diabetes surveillance can serve as a model for the surveillance of other chronic non-communicable diseases [44], as is recommended by the World Health Organization [22].

5. Conclusion

The implementation of diabetes surveillance should lead to the creation of a comprehensive and reliable data set for health-policy decision-making. Only when developments in the disease and diabetes care are systematically, periodically and regularly monitored and analysed, appropriate measures aimed at reducing the risk of diabetes and improving treatment can be evaluated and adapted. Improving the regional and sub-regional data pool and regionalised health monitoring is of particular importance here. In addition to providing policy advice, it is important to guarantee that information is made available to the public in a timely and continuous manner in cooperation with the German Federal Centre for Health Education. In the future, the surveillance of diabetes mellitus is to be used as a model with which to develop a similar system for other non-communicable diseases; this process will also involve striving for close international cooperation.

References


32. Deutsches Institut für Medizinische Dokumentation und Information (DIMDI) (2017) Informationssystem Versorgungsdaten https://www.dimdi.de/static/de/versorgungsdaten/index.htm (As at 06.03.2017)


Diabetes Surveillance in Germany – Background, concept and prospects

Imprint

Journal of Health Monitoring

Author details
Robert Koch Institute
Department for Epidemiology and Health Monitoring,
Berlin, Germany

Corresponding author
Dr. Lars Gabrys
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin, Germany
E-mail: GabrysL@rki.de

Conflicts of interest
The authors declared no conflicts of interest.

Publisher
Robert Koch Institute
Nordufer 20
D-13353 Berlin, Germany

Editors
Dr. Franziska Prütz, Martina Rabenberg,
Alexander Rommel, Dr. Anke-Christine Saß,
Stefanie Seeling, Martin Thißen, Dr. Thomas Ziese
Robert Koch Institute
Department for Epidemiology and Health Monitoring
General-Pape-Str. 62–66
D-12101 Berlin
Phone: +49 (0)30-18 754-3400
E-mail: healthmonitoring@rki.de
www.rki.de/journalhealthmonitoring-en

Typesetting
Gisela Dugnus, Alexander Krönke, Kerstin Möllerke

Please cite this publication as
Gabrys L, Schmidt C, Heidemann C et al. (2017)
Diabetes Surveillance in Germany – Background,
concept and prospects. Journal of Health Monitoring
ISSN 2511-2708

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