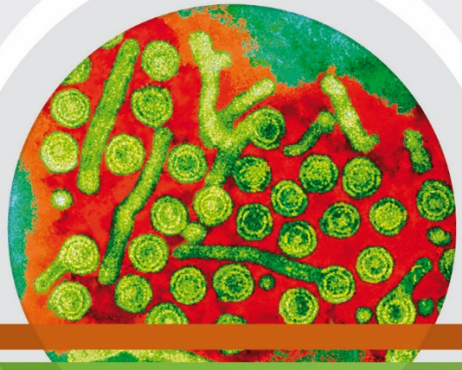


SURVEILLANCE REPORT

Annual Epidemiological Report for 2016

Hepatitis B

Key facts

- In 2016, 30 EU/EEA Member States reported 29 307 cases of hepatitis B virus (HBV) infection, corresponding to a crude rate of 5.5 cases per 100 000 population.
- Of these cases, 8.6% were reported as acute, 60.3% as chronic, 30.0% as 'unknown', and 1.1% could not be classified.
- The most affected age group for both acute and chronic infections was the group of 25–34-year-olds accounting for 23.6% and 32.3% of cases, respectively. The overall male-to-female ratio was 1.7 to 1.
- The rate of acute cases continues to decline, which is in accordance with global trends and most likely reflects the impact of national vaccination programmes.
- Among those acute cases reported with complete information, heterosexual transmission was most commonly reported (30.2%), followed by nosocomial transmission (16.6%) and transmission among men who have sex with men (12.4%). Among chronic cases, nosocomial transmission and mother-to-child transmission were the most common routes of transmission reported (32.6% and 31.6%, respectively).
- Prevention and control programmes need further scaling up if European countries are to achieve the goal of eliminating hepatitis B. Surveillance data are important in monitoring the epidemiological situation, and there is a need to improve their quality.

Methods

This report is based on 2016 data retrieved from The European Surveillance System (TESSy) on 31 Jan 2018. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1].

An overview of the national surveillance systems is available at the ECDC website [2].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

Suggested citation: European Centre for Disease Prevention and Control. Hepatitis B. In: ECDC. Annual epidemiological report for 2016. Stockholm: ECDC; 2018.

Stockholm, June 2018

This report includes data on newly diagnosed cases of hepatitis B reported to ECDC by EU/EEA countries. Countries were requested to apply the EU 2012 case definition for reporting at the European level[1], but other case definitions were also accepted [2].

Acute and chronic hepatitis B infections were differentiated by countries using defined criteria (Table 1).

Table 1. Criteria for differentiating acute and chronic hepatitis B

Stage	Definition
Acute	Detection of IgM core antigen-specific antibody (anti-HBc IgM) or Detection of hepatitis B surface antigen (HBsAg) and previous negative HBV markers less than six months ago or Detection of hepatitis B nucleic acid (HBV-DNA) and previous negative HBV markers less than six months ago Any of the above with or without symptoms and signs (e.g. jaundice, elevated serum aminotransferase levels, fatigue, abdominal pain, loss of appetite, intermittent nausea, vomiting, fever)
Chronic	Detection of HBsAg or HBeAg or HBV-DNA and No detection of anti-HBc IgM (negative result) or Detection of HBsAg or HBeAg or HBV-DNA on two occasions that are six months apart*
Unknown	Any newly diagnosed case which cannot be classified in accordance with the above definition of acute or chronic infection

** In the event that the case was not notified the first time.*

Surveillance systems across the EU/EEA countries are heterogeneous [2]. Twenty-two countries submitted national data in 2016 based on the 2012 EU case definition [4], four countries used the 2008 EU case definition, and four countries (Denmark, Germany, Italy, and Romania) used national case definitions. The 2008 EU case definition only allows for the reporting of acute hepatitis B cases whereas the 2012 case definition includes both acute and chronic cases. All reported cases were included in the analysis, regardless of which case definition was used. The data collected in accordance with the EU 2012 case definition represent confirmed cases; however, a few countries submitted 'probable' cases using alternative case definitions. Five countries (France, Greece, Hungary, Lithuania and Spain) only submitted data on acute cases.

Two countries, Bulgaria and Croatia, submitted aggregate data only and did not differentiate stages of infection.

Annual notification rates were calculated per 100 000 population for countries with comprehensive surveillance systems using Eurostat population data[2]. For data reported from the UK, population data from the Office for National Statistics were used to exclude Scotland, which did not report any hepatitis B data.

Hepatitis B data are presented by the 'date of diagnosis' or, if not available, by 'date used for statistics'. When comparing data using these two dates across the database, there were only minor differences between them in a few countries.

Italy reports data using two data sources. One of these sources has national coverage, but includes only a limited number of variables and does not identify cases as acute or chronic, which limits its inclusion in this report. The other data source in Italy is a sentinel system that includes epidemiological data on a range of variables and covers an average of 72% of the population (2007–2016). The sentinel population is considered representative of the wider population; data were therefore scaled up to 100%. This source was used for epidemiological analyses, including the route of transmission and importation status. The data source for Belgium is a sentinel system with unknown coverage. National rates were therefore not calculated for Belgium.

Epidemiology

Overall trends

For 2016, 30 EU/EEA Member States reported 29 307 cases of hepatitis B virus (HBV) infection, a crude rate of 5.5 cases per 100 000 population. No data were reported from Liechtenstein. Of these cases, 2 529 (8.6%) were reported as acute, 17 662 (60.3%) as chronic, 8 780 (30.0%) as 'unknown', and 336 cases (1.1%) could not be classified due to an incompatible data format.

[1] 2012/506/EC: Commission Implementing Decision of 8 August 2012 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council.

[2] Eurostat database: http://epp.eurostat.ec.europa.eu

In 2016, 26 countries were able to provide data on acute cases (Table 2). The overall rate of acute cases was 0.6 per 100 000 population, ranging from no cases in Luxembourg and Cyprus to 3.7 in Latvia (Figure 1). Looking only among the 16 countries that have reported consistently between 2007 and 2016, the rate for acute cases has shown a steady decline from 1.2 cases per 100 000 population in 2007 to 0.6 cases per 100 000 population in 2016 (Figure 2). The rate of acute cases has been reported by Portugal since 2012 and has shown a steady increase since then.

In 2016, 20 countries submitted data on chronic infections. The overall notification rate was 8.7 cases per 100 000 population, ranging from <0.1 in Romania and Cyprus to 18.7 in Sweden (Table 2). The United Kingdom (excluding Scotland) reported 57.7% of all chronic cases reported in 2016. Among countries that have reported consistently between 2007 and 2016, the rate of reported chronic cases increased from 7.2 cases per 100 000 population in 2007 to 12.8 in 2016.

Table 2. Number and rate per 100 000 population of reported hepatitis B cases in the EU/EEA by country and year, 2012–2016†

Country	2012		2013		2014		2015		2016							
	All		All		All		All		All		Acute*		Chronic*		Unknown*	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
Austria	497	5.9	646	7.6	1144	13.4	1054	12.3	1304	15.0	80	0.9	642	7.4	582	6.7
Belgium**	.	-	1800	-	1557	-	1734	-	1757	-	.	-	.	-	1757	-
Bulgaria	322	4.4	302	4.1	235	3.2	263	3.7	219	3.1	.	-	.	-	.	-
Croatia	136	3.2	136	3.2	149	3.5	112	2.7	117	2.8	.	-	.	-	.	-
Cyprus	14	1.6	9	1.0	4	0.5	2	0.2	0	0.0	0	0.0	0	0.0	0	0.0
Czech Republic	154	1.5	133	1.3	106	1.0	121	1.1	244	2.3	69	0.7	175	1.7	0	0.0
Denmark	298	5.3	283	5.1	229	4.1	276	4.9	275	4.8	14	0.2	261	4.6	0	0.0
Estonia	51	3.8	36	2.7	34	2.6	34	2.6	22	1.7	7	0.5	15	1.1	.	-
Finland	249	4.6	268	4.9	276	5.1	397	7.3	348	6.3	12	0.2	336	6.1	.	-
France	100	0.2	83	0.1	94	0.1	99	0.1	92	0.1	92	0.1	.	-	.	-
Germany***	687	0.9	687	0.9	767	0.9	2011	2.5	2948	3.6	620	0.8	.	-	2328	2.8
Greece	50	0.5	32	0.3	27	0.2	20	0.2	18	0.2	18	0.2	.	-	.	-
Hungary	53	0.5	62	0.6	65	0.7	45	0.5	55	0.6	55	0.6	.	-	.	-
Iceland	20	6.3	16	5.0	28	8.6	17	5.2	59	17.7	3	0.9	8	2.4	48	14.4
Ireland	571	12.5	429	9.3	426	9.2	543	11.7	478	10.1	31	0.7	413	8.7	34	0.7
Italy	561	0.9	489	0.8	500	0.8	361	0.6	308	0.5	.	-	.	-	308	0.5
Latvia	329	16.1	305	15.1	304	15.2	394	19.8	368	18.7	73	3.7	295	15.0	.	-
Lithuania	23	0.8	35	1.2	26	0.9	32	1.1	32	1.1	32	1.1	.	-	.	-
Luxembourg	26	5.0	38	7.1	32	5.8	46	8.2	66	11.5	0	0.0	66	11.5	0	0.0
Malta	19	4.6	17	4.0	22	5.2	18	4.2	33	7.6	7	1.6	14	3.2	12	2.8
Netherlands	1525	9.1	1305	7.8	1217	7.2	1129	6.7	1128	6.6	114	0.7	1001	5.9	13	0.1
Norway	706	14.2	738	14.6	695	13.6	815	15.8	763	14.6	23	0.4	740	14.2	.	-
Poland	78	0.2	1541	4.0	2762	7.3	51	0.1	3806	10.0	50	0.1	1464	3.9	2292	6.0
Portugal	28	0.3	24	0.2	57	0.5	144	1.4	155	1.5	30	0.3	58	0.6	67	0.6
Romania	378	1.9	309	1.5	266	1.3	229	1.2	196	1.0	188	1.0	8	0.0	.	-
Slovakia	159	2.9	194	3.6	191	3.5	197	3.6	161	3.0	50	0.9	111	2.0	.	-
Slovenia	41	2.0	52	2.5	39	1.9	44	2.1	40	1.9	18	0.9	22	1.1	.	-
Spain	525	1.1	645	1.4	633	1.4	527	1.1	515	1.1	515	1.1	.	-	.	-
Sweden	1624	17.1	1691	17.7	1966	20.4	2281	23.4	2039	20.7	103	1.1	1843	18.7	93	0.9
United Kingdom****	8761	15	9149	15.6	11705	19.8	12237	20.5	11761	19.5	325	0.5	10190	17.0	1246	2.1
Total EU/EEA	**17985**	**3.6**	**21454**	**4.0**	**25556**	**4.8**	**25233**	**4.7**	**29307**	**5.5**	**2529**	**0.6**	**17662**	**8.7**	**8780**	**2.4**

. = Not reported

- = Not calculated

† Data presented by date of diagnosis.

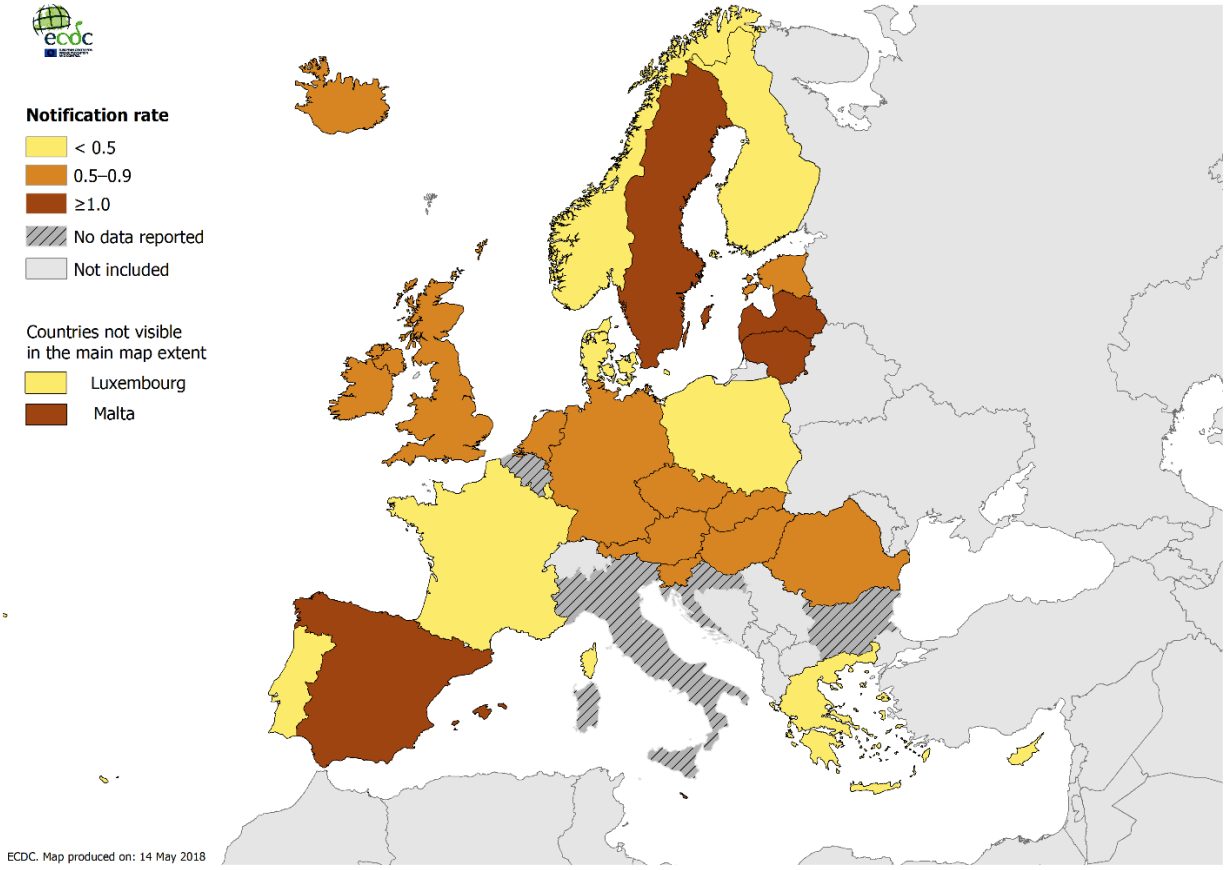
** Includes the cases reported by countries as acute, chronic or unknown using the differentiation criteria.*

*** Data from Belgium comes from a sentinel system with unknown coverage; therefore population rates cannot be calculated.*

**** Germany uses a national case definition which changed in 2015, likely explaining some of the recent increases in hepatitis B cases.*

***** Excludes data from Scotland.*

Figure 1. Rate of acute hepatitis B cases* per 100 000 population by country, EU/EEA, 2016



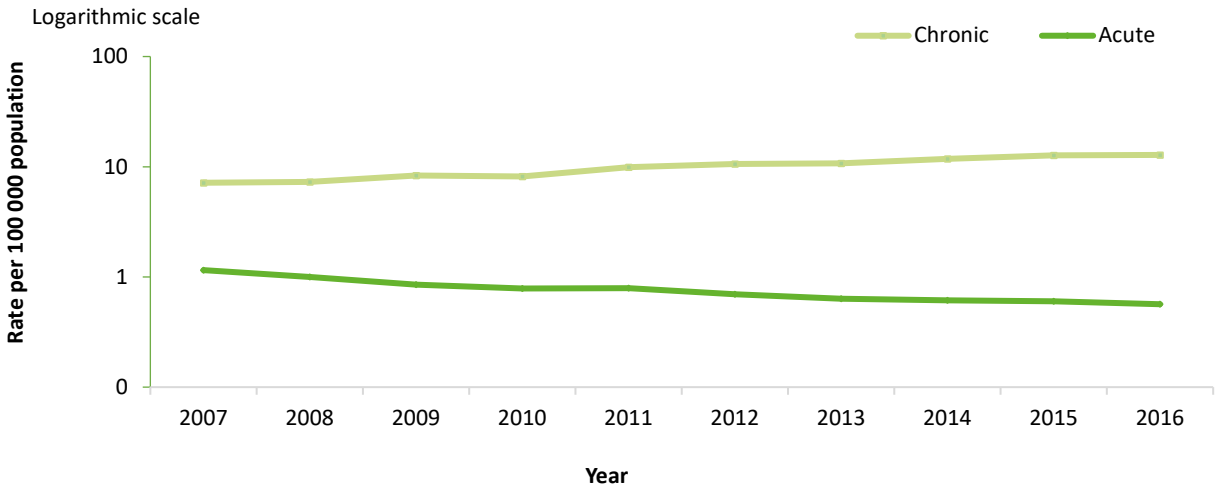
*Source: Country reports from Austria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France**, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom***.*

** Countries were included if they were able to present data by disease status or used a case definition that includes only acute cases (e.g. EU 2008) or were known to only report acute cases, and had national coverage.*

*** Underreporting of acute hepatitis B in France was estimated at 76.5% in 2013.*

**** UK data exclude Scotland.*

Figure 2. Rates of acute and chronic hepatitis B per 100 000 population by year in countries reporting consistently, EU/EEA, 2007–2016



Source: Acute cases: Country reports from Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Latvia, the Netherlands, Norway, Romania, Slovakia, Slovenia, Sweden, and the United Kingdom**.*

*Chronic cases: Country reports from Denmark, Estonia, Finland, Ireland, Latvia, the Netherlands, Norway, Slovakia, Slovenia, Sweden, and the United Kingdom**.*

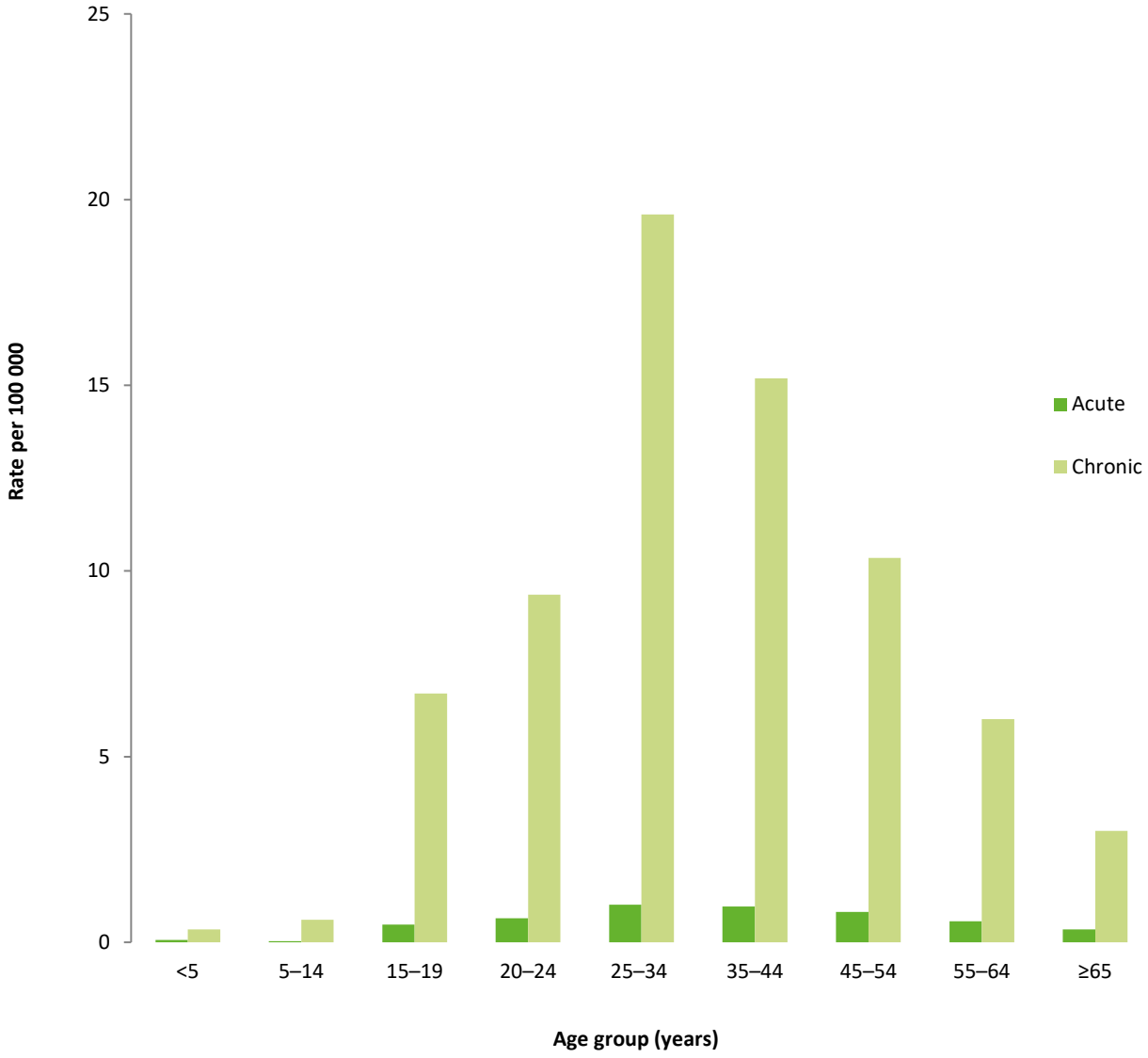
** Underreporting of acute hepatitis B in France was estimated at 76.5% in 2013.*

*** UK data exclude Scotland.*

Age and gender

In 2016, 16 811 cases of hepatitis B were reported in males (6.9 cases per 100 000 population), and 10 562 cases were in females (4.1 cases per 100 000 population), representing a male-to-female ratio of 1.7:1. The male-to-female ratio was higher among acute cases (2.0:1) than among chronic cases (1.7:1). Just under one third of all cases (29.5%) were among 25–34-year-olds. The age distributions among reported cases of acute and chronic infections were similar (Figure 3), with 11.9% of acute cases and 12.3% of chronic cases in people under 25 years of age. Among countries reporting consistently every year since 2007, the proportion of acute cases below 25 years of age declined from 25.1% in 2007 to 14.2% in 2016. The proportion of chronic cases under 25 declined from 21.4% in 2007 to 13.0% in 2016.

Figure 3. Rates of acute and chronic hepatitis B per 100 000 population by age group, EU/EEA, 2016



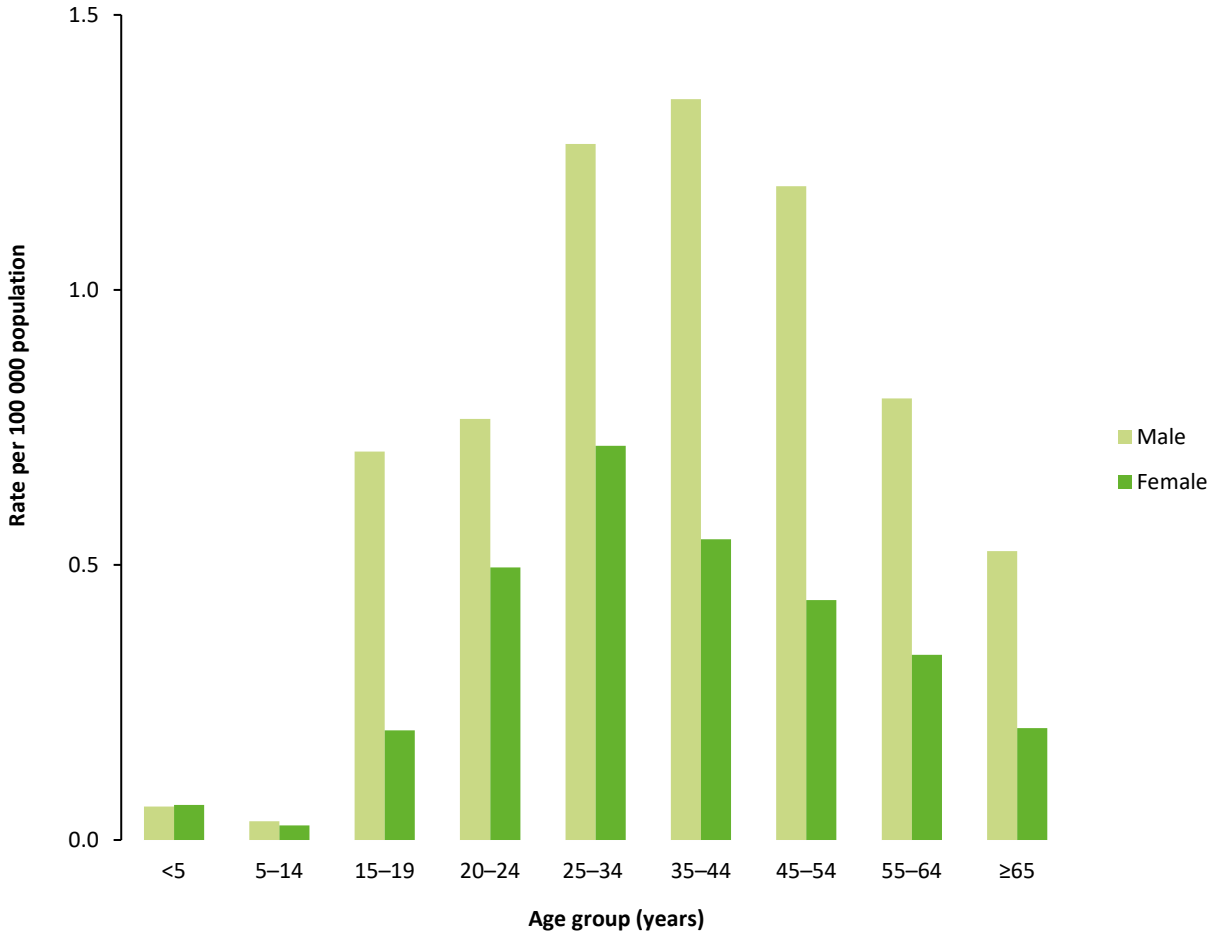
Source: Country reports from Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom**.*

** Underreporting of acute hepatitis B in France was estimated at 76.5% in 2013.*

*** UK data exclude Scotland.*

The age distribution among male and female acute cases was similar, although for all age categories (except 0–4 years) the rates were higher among males than females (Figure 4).

Figure 4. Rate of reported acute hepatitis B cases per 100 000 population, by age group and gender, EU/EEA, 2016



Source: Country reports from Austria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom**.*

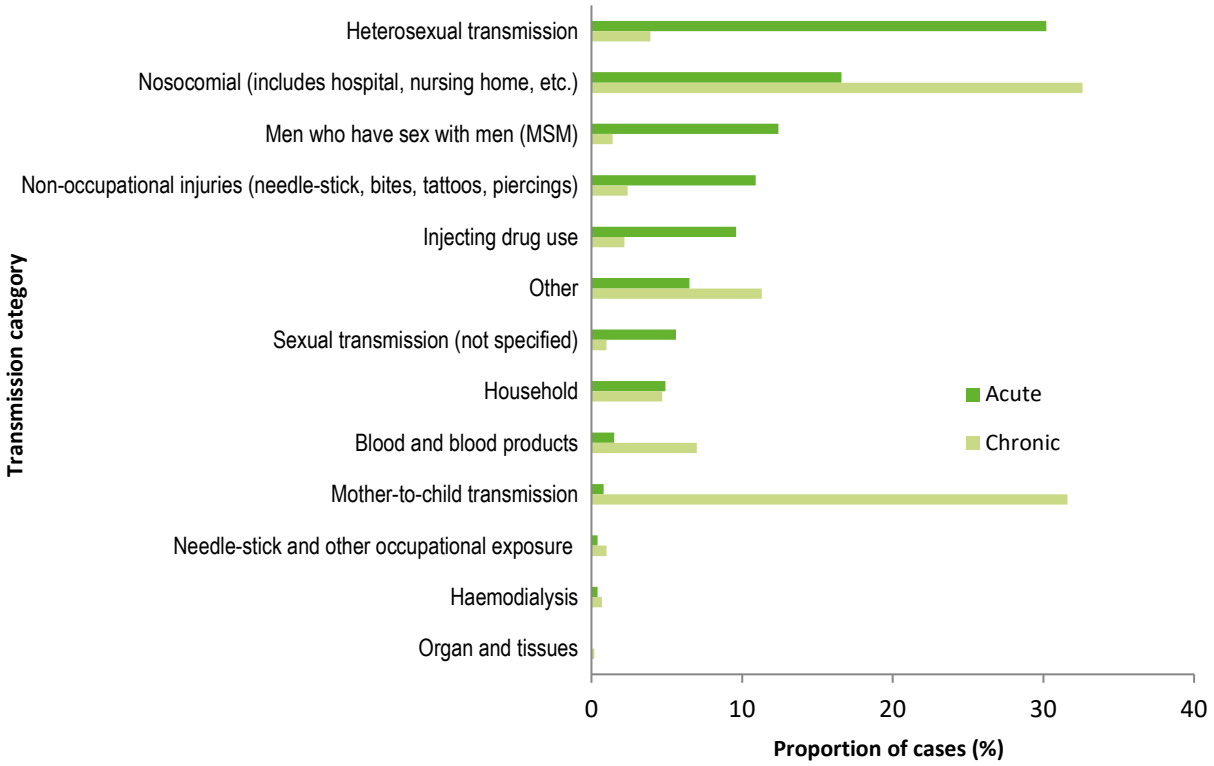
** Underreporting of acute hepatitis B in France was estimated at 76.5% in 2013.*

*** UK data exclude Scotland.*

Route of transmission

The data on transmission were complete for only 5 346 (18.2%) of the reported hepatitis B cases in 2016 (30.8% completeness for acute cases, 15.0% completeness for chronic cases). For the 778 acute cases with complete information, heterosexual transmission was most commonly reported (30.2%), followed by nosocomial transmission (16.6%), transmission among men who have sex with men (12.4%), non-occupational injuries (10.9%) and injecting drug use (9.6%) (Figure 5). Italy, Poland and Romania accounted for more than two thirds (69.1%) of the acute cases attributed to nosocomial transmission. Nosocomial transmission and mother-to-child transmission were the most common routes of transmission reported for the 2 641 chronic cases with complete information (32.6% and 31.6% respectively). Poland reported 91.9% of chronic cases attributed to nosocomial transmission. Among cases attributed to mother-to-child transmission, 91.7% were reported by three countries (Denmark, the Netherlands, and Sweden). Of the chronic cases attributed to mother-to-child transmission, 92.7% were classified as being imported. Due to incompleteness and variation of reporting over time, trends are difficult to interpret.

Figure 5. Transmission category of hepatitis B cases by acute and chronic disease status, EU/EEA, 2016*



*Source: Country reports from Austria, Denmark, Estonia, Finland, France**, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain and Sweden.*

** Cases where transmission status is known.*

*** Underreporting of acute hepatitis B in France was estimated at 76.5% in 2013.*

Importation status

In 2016, of 9 535 cases (32.5%) with information on importation status, 4 482 (47.0%) were reported by 24 countries as being imported. The majority of these imported cases (86.8%) were chronic infections; 3 283 (73.2%) were reported by three countries (Netherlands, Norway, and Sweden). The proportion of chronic cases (73.9%) reported as imported was higher than the proportion of acute cases (11.6%). The data completeness varied across countries, but among countries with complete data (>75%) on importation status, the proportion of chronic cases classified as imported ranged from 0% (Czech Republic, Malta, Portugal, and Romania) to over 85% (Denmark, Luxembourg, Norway and Sweden).

Outcome

Data on the outcome of infection were reported for 7 072 cases (24.1%) in 2016. Of these cases, 47 (0.7%) were reported to have died from causes related to hepatitis B. Although the number of reported directly attributable deaths remains low, there has been a slight increase in the number and proportion of deaths since 2007 (35 deaths, 0.6%).

Discussion

The number of newly diagnosed hepatitis B infections reported from countries across Europe remains high, with the majority of these infections classified as chronic. A marked variation between countries in the distribution of acute and chronic cases was observed. This geographical variation most likely reflects differences in local testing and reporting practices as well as underlying epidemiological differences. For acute hepatitis B cases, no striking geographical trends were observed, but three of the six countries with rates over 1.0 per 100 000 population (Latvia, Lithuania, and Romania) are located in the eastern part of Europe where the underlying prevalence of chronic hepatitis B infection is known to be highest [5]. For the newly diagnosed cases of chronic hepatitis B reported to ECDC, the geographical trends are unclear, as data for many countries are missing. However, some of the highest rates were reported from west European countries (Norway, Sweden, and the United Kingdom), which

is contrary to what may be expected based on the results from seroprevalence surveys that indicate these countries to be of low endemicity (<1.0%). However, it is likely that prevalence surveys from north European countries with high levels of immigration may underestimate the true prevalence of hepatitis B as studies may not include migrant populations from intermediate and high (>1.0%) endemicity countries [6]. The discrepancy between reported notifications and prevalence estimates highlights the difficulty in interpreting routine surveillance data for chronic infections which are mostly asymptomatic until late stages of the disease. Indeed, the chronic hepatitis B data reported appear to reflect the intensity of local testing and screening policies, with the highest rates reported from countries that are known to have comprehensive testing programmes [7,8]. Although chronic hepatitis B data are missing from some north European countries, the data are dominated by the high number of cases reported from this part of the region, accounting for a substantial proportion of the cases and this has a strong influence on the trends.

The interpretation of the trends over time may be hampered by changes to the surveillance systems in some countries. Germany uses a national case definition, which changed in 2015, likely explaining some of the increase in cases of hepatitis B. Part of this might also be due to migration from high-prevalence countries, in particular male cases with younger age.

The overall trend for acute cases in the EU/EEA has shown a steady decline between 2007 and 2016. This decline is most likely related to the national hepatitis B vaccination programmes [9].

Data completeness for several variables is poor but some improvement was seen in 2016 relative to previous years. The number of countries using the 2012 EU case definition was higher in 2016 than in previous years. While the number of reporting countries has varied from year to year but increased over time, the total number of countries reporting data has remained stable over the last few years.

Data on importation status of cases remain incomplete, but the impact of migration on reported cases of hepatitis B in Europe is striking for some countries, especially among chronic infections. Data from five western European countries with fairly complete reporting (Denmark, Finland, Norway, the Netherlands and Sweden) indicate that a high proportion of newly diagnosed infections are considered to have been acquired outside the reporting country. In recent decades, migrants to many countries in Europe, including northern Europe, come from countries with high prevalence of hepatitis B, and prevalence among some of these migrant groups is often high [6,11]. A recent study on the epidemiological burden of hepatitis among migrant populations estimated the burden of infection among migrants in relation to the overall number of chronically infected hepatitis B cases in Europe to be around 25% [11]. The study concluded that migrant populations are often disproportionately affected by hepatitis B and are a key risk group for chronic hepatitis B in certain EU/EEA countries. The influence of migration on hepatitis B highlights the need for countries to develop evidence-based screening interventions that are targeted to the most disproportionately affected migrant communities. It also highlights the importance of monitoring routine surveillance indicators of migration, such as importation status.

Transmission data are key to understanding the epidemiology of hepatitis B. While transmission data completeness was better for acute cases than chronic cases, the overall incompleteness impairs the interpretation of differences between countries, and the data are unlikely to be fully representative. The most common routes of transmission reported among acute cases include heterosexual contact, nosocomial transmission, sex between men and injecting drug use. Although nosocomial transmission is an uncommon route of transmission for acute cases in most European countries, it remains a key route of transmission in some, highlighting the importance of maintaining robust infection control practices across healthcare settings. Mother-to-child transmission is the second most common route of transmission among reported chronic cases but is dominated by the large number of cases reported by three west European countries (Denmark, the Netherlands, Sweden), with most of these cases classified as being imported. The validity of the reported route of transmission among imported cases is not known and could form a subject for future study. The changes over time in the completeness of reporting of transmission data impede any comparisons of the data over the period.

In May 2016, the World Health Assembly adopted the first global health sector strategy on viral hepatitis aimed at elimination [12]. The concept of elimination for these infections is based on reducing the incidence of chronic infections by 90% and the associated mortality by 65% by 2030. Achieving these targets will require significant scaling-up of key interventions, including hepatitis B childhood vaccination, birth-dose vaccination or other means to prevent mother-to-child transmission, improved systems to assure safe blood transfusions/blood products, injection safety, interventions aimed at prevention of transmission among people who inject drugs, and increased testing with linkage to care and treatment. To support the implementation of this strategy, it is important that countries have a strong system of surveillance to monitor the impact of the interventions. This also highlights the need for continued efforts to improve the quality of the collected and reported data.

Public health implications

Robust epidemiological information is essential to inform effective prevention and control priorities, assess the impact of implemented strategies, and monitor the progress towards achieving the global elimination targets. The interpretation of hepatitis B data collected through routine notification-based surveillance is challenging because of the asymptomatic nature of chronic infections, differences in testing programmes, continued differences in surveillance practices between countries, and data quality issues. Despite such challenges, the relatively high number of reported cases (especially of chronically infected persons) and the diversity in reported transmission routes across Europe suggest that countries need to maintain and strengthen local prevention and control programmes. The evidence of ongoing transmission and the continued importation of cases to many European countries demonstrate a clear need to improve the quality of surveillance data, especially with regard to data on transmission routes, country of birth, and whether cases are considered to be imported.

Further work is also needed to assist countries in adopting the current EU case definition in order to standardise surveillance across countries. ECDC will continue to support Member States in this area and will develop alternative epidemiological methods to complement routine surveillance, such as seroprevalence and sentinel surveys, which will help provide a more complete understanding of the epidemiology.

References

1. European Centre for Disease Prevention and Control. Introduction to the Annual Epidemiological Report. In: ECDC. Annual epidemiological report for 2016 [Internet]. Stockholm: ECDC; 2017 [cited 30 May 2017]. Available from: http://ecdc.europa.eu/annual-epidemiological-reports-2016/methods
2. European Centre for Disease Prevention and Control. Surveillance systems overview [Internet, downloadable spreadsheet]. Stockholm: ECDC; 2018. Available from: http://ecdc.europa.eu/publications-data/surveillance-systems-overview-2016
3. European Centre for Disease Prevention and Control. Surveillance atlas of infectious diseases [Internet]. Stockholm: ECDC; 2017 [cited 30 May 2017]. Available from: http://atlas.ecdc.europa.eu.
4. European Commission. Commission implementing decision of 8 August 2012 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council (notified under document C(2012) 5538) – (Text with EEA relevance) – (2012/506/EU). Brussels: European Commission; 2012. Available from: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012D0506&qid=1428573336660&from=EN#page=15
5. European Centre for Disease Prevention and Control. Systematic review on hepatitis B and C prevalence in the EU/EEA. Stockholm: ECDC; 2016. Available from: http://ecdc.europa.eu/publications-data/systematic-review-hepatitis-b-and-c-prevalence-eueea
6. Sharma S, Carballo M, Feld JF, Janssen HLA. Immigration and viral hepatitis. J Hepatol. 2015; 63(2): 515-522.
7. Duffell EF, van de Laar MJ. Survey of surveillance systems and select prevention activities for hepatitis B and C, European Union/European Economic Area, 2009. Euro Surveill. 2015 Apr 2;20(13):17-24. Available from: http://www.eurosurveillance.org/content/10.2807/1560-7917.ES2015.20.13.21080
8. European Centre for Disease Prevention and Control. Surveillance and prevention of hepatitis B and C in Europe. Stockholm: ECDC; 2010. Available from: http://ecdc.europa.eu/publications-data/surveillance-and-prevention-hepatitis-b-and-c-europe
9. Ott JJ, Stevens G A, Groeger J, Wiersma ST. Global epidemiology of hepatitis B virus infection: New estimates of age-specific HBsAg seroprevalence and endemicity. Vaccine 2012; (30) 2212–2219.
10. Kirwan P, Evans B, Sentinel Surveillance of Hepatitis Testing Study Group, Brant L. Hepatitis C and B testing in English prisons is low but increasing. J Public Health. 2011 Jun;33(2):197-204.
11. European Centre for Disease Prevention and Control. Epidemiological assessment of hepatitis B and C among migrants in the EU/EEA. Stockholm: ECDC; 2016. Available from: http://ecdc.europa.eu/publications-data/epidemiological-assessment-hepatitis-b-and-c-among-migrants-eueea
12. World Health Organization. Global health sector strategy on viral hepatitis 2016–2021 – Towards ending viral hepatitis. Geneva: WHO; 2016. Available from: http://www.who.int/hepatitis/strategy2016-2021/ghss-hep